VOL. XXX NEW YORK—THURSDAY, MAY 7, 1914—CHICAGO No. 19

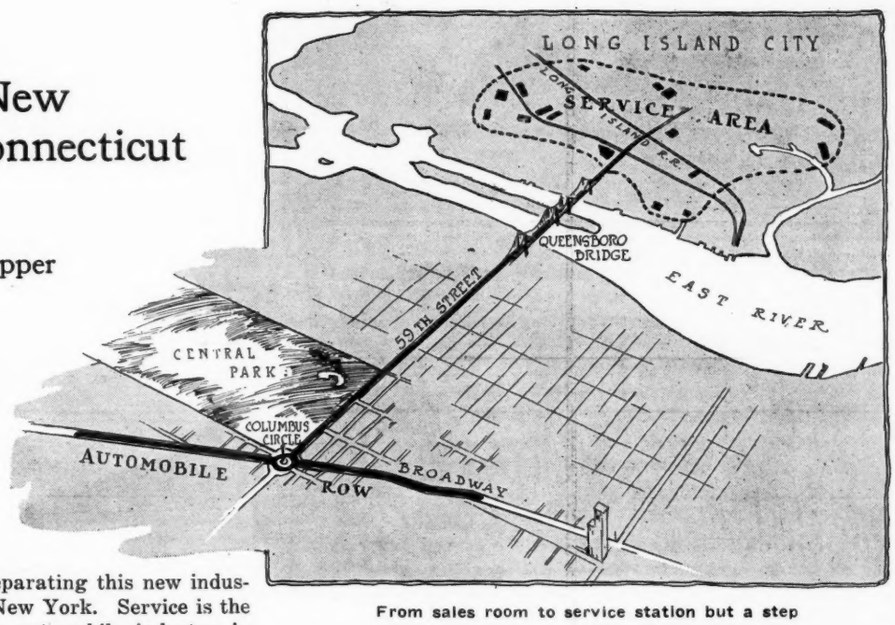
The AUTOMOBILE

Long Island City Provides Service for 100,000 Cars

Easily Accessible To New York, New Jersey and Connecticut

By J. Edward Schipper

ONE HUNDRED thousand car owners in Greater New York and vicinity need service and they are going to Long Island City to get it. Each succeeding year sees more service buildings added to the number in this city-within-a-city and each successive season finds augmented the stream of cars which crosses the big bridge separating this new industrial center from the older part of New York. Service is the keynote of the development of the automobile industry in Long Island City.



From sales room to service station but a step

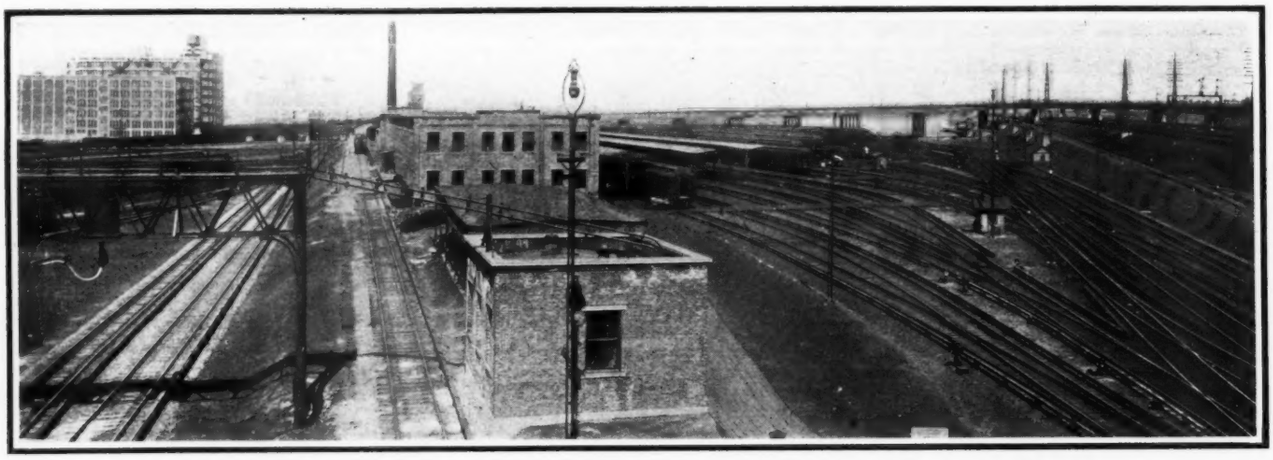
The reasons for the development of Long Island City as a service section are not hard to seek. Lying practically at the door of the Metropolis, within a few minutes ride of Automobile Row through which such a large percentage of the cars used in New York, New Jersey and Connecticut are sold, and yet affording ideal conditions for the building of plants, it is but natural that manufacturers have seized this opportunity. Land costs but a small percentage of what is charged in Manhattan, the labor supply is unlimited and transportation facilities are such that the country for miles around is within the zone of a 5-cent fare.

Population 334,297 in 1912

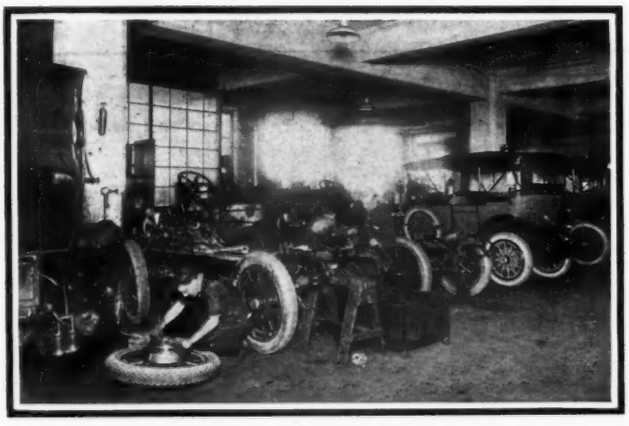
By the act of consolidation of 1897 Queens County, which was then comprised of the towns of Long Island City, Newton, Flushing, Jamaica and Hempstead, some of which were settled as early as 1640, was amalgamated as the Borough of Queens as part of the City of New York. Its estimated population in 1912 was 334,297.

Ten automobile companies now have buildings devoted to the serving of the needs of people using their cars. Three have buildings under construction and others are negotiating for property in this section and yet the development of Long Island City as a service district is but 3 years old. In 1910 the Packard company started the movement by erecting an eight-story concrete building devoted entirely to serving the needs of Packard owners. The territory covered by this service station embraces Greater New York, Northern New Jersey and Connecticut and at this season sixty cars a day are being repaired.

At the same time that the Packard building was being erected the Ford company started a building and in the early part of 1911 engaged 200 employees in service work.



The Sunnyside yards of the Pennsylvania Railroad bring Long Island City in touch with the West



In the Packard service station about sixty cars a day are handled and a large amount of dead storage work taken care of

At the present time 450 men are employed, the building has been increased from four to nine stories and between 150 and 300 cars are repaired per day. Outside of repair work assembling is done and cars are shipped through New York State to the Canadian border, Connecticut and New Jersey. The capacity of this plant will shortly be enlarged and 1,000 employees will have their headquarters here.

Car, Truck and Body Makers Represented

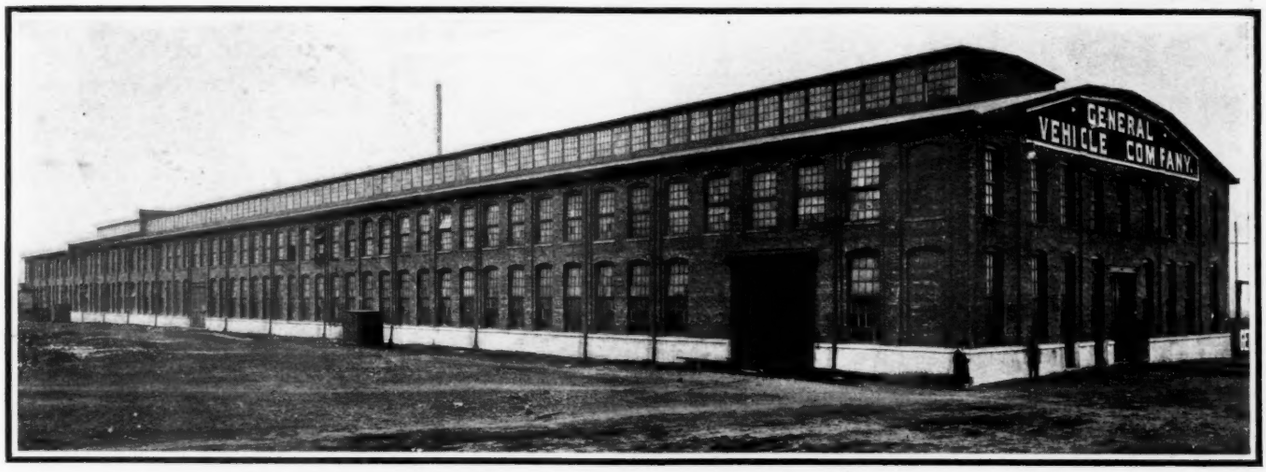
Manufacturing interests have also recognized Long Island City as an advantageous location for securing material and for shipping. Brewster & Co., the well-known body builder has a six-story brick concrete and steel building and employs 500 men in the manufacture and repair of automobile bodies, besides the importation of Delauney Belleville and Rolls-Royce cars. The General Vehicle Co., makers of electric commercial cars started with a two-story, 100 by 500 foot building 9 years ago. They now have four additional modern buildings and employ between 450 and 500 men turning out about seventy-five electric trucks per month.

The labor supply of Long Island City is unlimited because within easy traveling distance it has a population of 6,000,000 to draw from. This gives the manufacturer of service station a choice of labor which cannot be equalled anywhere. He is able to choose what he needs from the highest skilled man to the newly-arrived immigrant. In fact, according to statistics made up by the Chamber of Commerce in 1909, Queens Borough ranked seventeenth in value of manufactured products, as compared with all cities in the United States.

While the service station is distinctly different from the factory because raw materials are not required, but merely a stock of parts to meet the needs of owners bringing their cars for repairs, still the shipping facilities of a service station are of some importance. In order that parts may be secured without delay, it is necessary that these facilities be good. In this particular, Long Island City is most favorably situated, having at hand the Pennsylvania tubes which connect it with the West, the Queens Borough bridge bringing the river front section close to the distributing agencies of the heart of Manhattan and the tracks of the Pennsylvania and Long Island Railroads.

This network of transportation facilities not only enables the service plant to secure from the factory the parts in the shortest possible time, but also permits the owner to either bring his car to the plant or to send to it such parts as are defective for repair. Convenience and service are complementary. To be of the utmost value the service station must be handy to the car user. In Manhattan rents and property are so costly that the profit made on service has not been

Above—The new Pierce-Arrow, which is now in full swing doing forty repair jobs a day. Below—The factory of the new Singer Motor Co., in the Alco building



Part of the plant of the General Vehicle Co., which is located in Long Island City

thought by many companies to be enough to cover the expenses of service buildings. Long Island City has been made the answer to this problem.

Many Makers Secure Sites

Owing to the rapidly growing values of property in Long Island City, plots for service buildings are rapidly being secured by automobile manufacturers. The Lozier Motor Co. has recently purchased a plot of land on Thompson avenue and Hill street. Renault Frères have bought a plot of land 17,500 square feet in area at Jackson and Third avenues and will shortly build a two-story service building to take care of their cars in the vicinity of Greater New York.

In June, 1912, the Simplex Automobile Co. completed a service building on Vernon avenue between Eleventh and Twelfth streets, covering a full block in frontage and designed to take care of the interests of Simplex owners. Although the American Locomotive Co. no longer manufactures automobiles it still maintains a large building at Jackson avenue and Bulkley street in which they make repairs on Alco cars. A part of this building has been leased by the new Singer Motor Co., as a factory and service station.

Motor and transmission department of Ford service plant

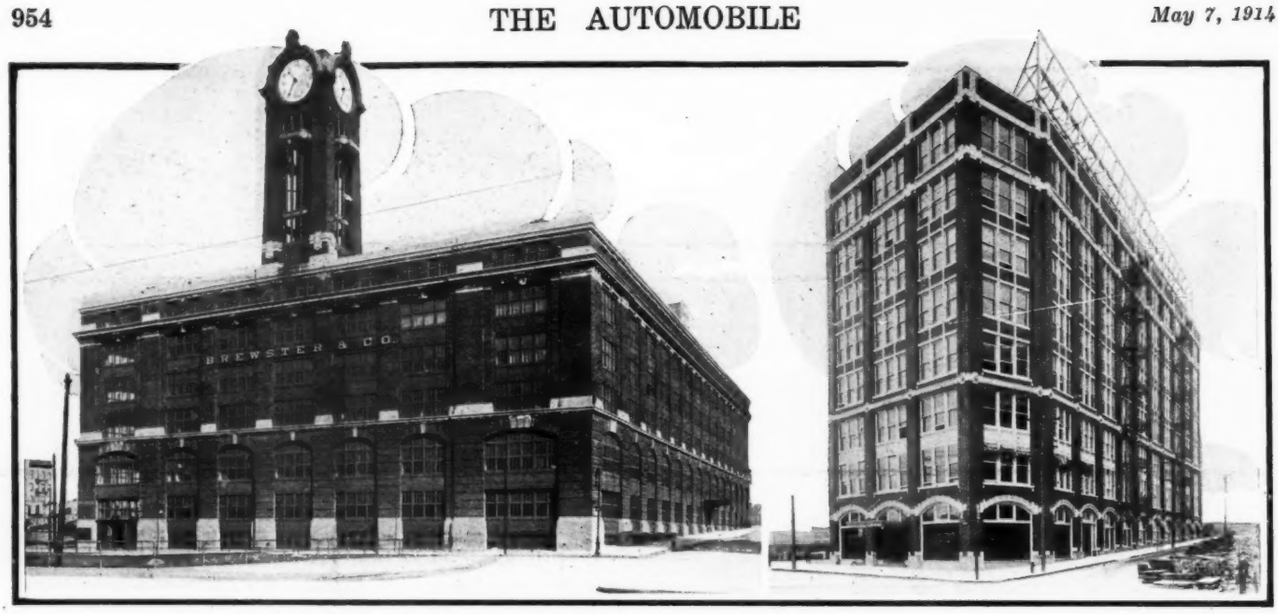
Above—Simplex service station. Below—The new buildings of the General Vehicle Co. are shown to the left and the old building illustrated above, to the right

The Harrolds Motor Car Co., New York distributors of the Pierce-Arrow, has recently completed a steel and concrete building capable of accommodating 500 cars at a time and having a floorspace of 100,000 square feet. This is a four-story building occupying the entire block between Fifth and Sixth avenues fronting on Freeman avenue. At the present time about forty cars a day are repaired in this service station.

Tire Companies Have Service Stations

Finished cars alone do not occupy all the buildings claimed by the automobile industry in Long Island City. The Goodyear Rubber Tire Co. has realized the value of having a distributing point near the key of the eastern market and in view of this has just completed a $400,000 structure on a 200 by 100-foot plot. This building is practically ready to be occupied. It is directly across the street from the Ford building. The Akron Tire Co., located at Honeywell avenue and Skillman street, is also erecting a service building and manufacturing plant which is just completed. The Dunlop Wire Wheel Co. has taken a floor in the Neptune Meter Building and has now commenced operation with an annual output of 50,000 wheels. The American Ever-Ready Co., has under construction an eight-story 200 by 300-foot factory for the manufacture of electric accessories.

Some of the companies have combined and leased parts of a building which is divided into a service station for several



Left—The plant of Brewster & Co., body builders. Right—Ford service station

makes of cars. The Galvin building is a good example of this as within it are housed at the present time the service stations of the Renault, Maxwell and Benz companies and the factories of G. Piel and the Metal Stamping companies.

Payroll Is $10,000 a Day

At least 2,500 men are at the present time employed in service work in Long Island City, representing a payroll of $10,000 a day. These men take care of the repairs on at least 300 cars a day coming from Greater New York, a large section of the northern part of New Jersey, southern part of Connecticut and Long Island. The residential facilities for these men are excellent, and offer homes for rent at far more reasonable rates than they would be able to secure in the Borough of Manhattan for instance. Although the residential facilities are just being developed, an appreciable percentage of the workers in this vicinity live in the neighborhood. Out of a total of 473 men employed in the Brewster company's factory, 155 live in the Borough of Queens. The distribution of the homes of the men are as follows: Queens, 155, Brooklyn, forty, Manhattan, 196, Richmond, nothing, Bronx, fifty-eight, New Jersey, eighteen, miscellaneous, six. In Long Island City proper are fifty-three.

One of the features of Long Island City is the rapid transit system which has been laid out at a cost of $22,000,000. This includes the Steinway tunnel from Grand Central station, Manhattan, to Long Island City, the Steinway tunnel extension to Queens Borough Bridge, the subway and elevated lines radiating from the Queens Borough bridge and the various elevated lines forming connecting links between these lines which will bring the entire zone within range of a 5-cent fare.

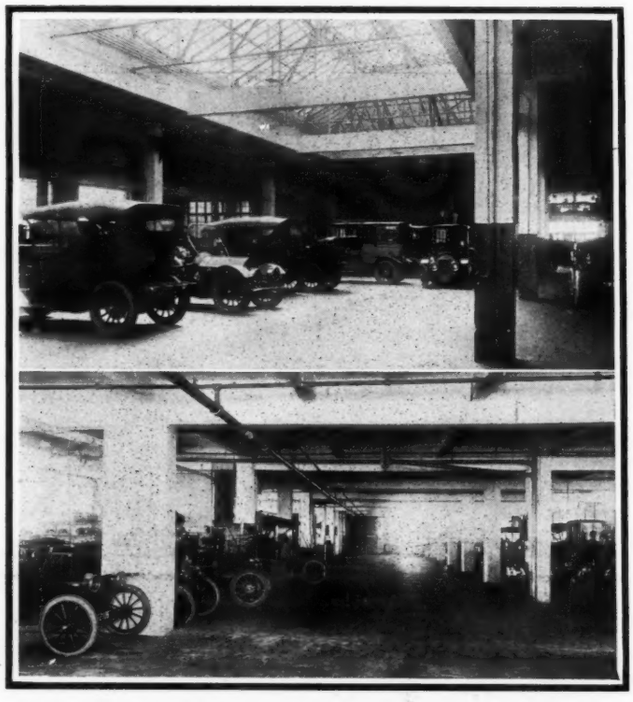
The Gateway to Long Island

Long Island City is the gateway to practically all of Long Island as far as the automobile tourist is concerned. By far the largest part of the pleasure seeking automobile traffic passing into Long Island crosses the huge cantilever bridge connecting it with Manhattan Island. The history of this bridge dates back to 1899 when the plans were submitted to the Secretary of War. The construction was approved by the Mayor of New York in 1900 and the plans approved by the War Department in 1901. That same year the Board of Aldermen authorized condemnation proceedings for the land required and construction was commenced. The total amount of contracts awarded was $11,974,402. The bridge was opened March 30, 1909, and was operated as a toll bridge until July 18, 1911, when the tolls was abolished by the Board of Aldermen. The total length of the bridge is 8,601 feet. It is in five spans and has a clear height over the East River channel of 135 feet.

The history of Long Island City dates back to 1870 when it was formed from the town of Newtown which was then divided into two parts, one of which was known as Long Island City and the other as Newtown. At the last official census of 1910 the population of Long Island City was 61,763.

All the Plants Are Roomy

All the service plants on Long Island City are distinguished by their roominess and by the ideal conditions for air and light by which they are surrounded. Owing to the



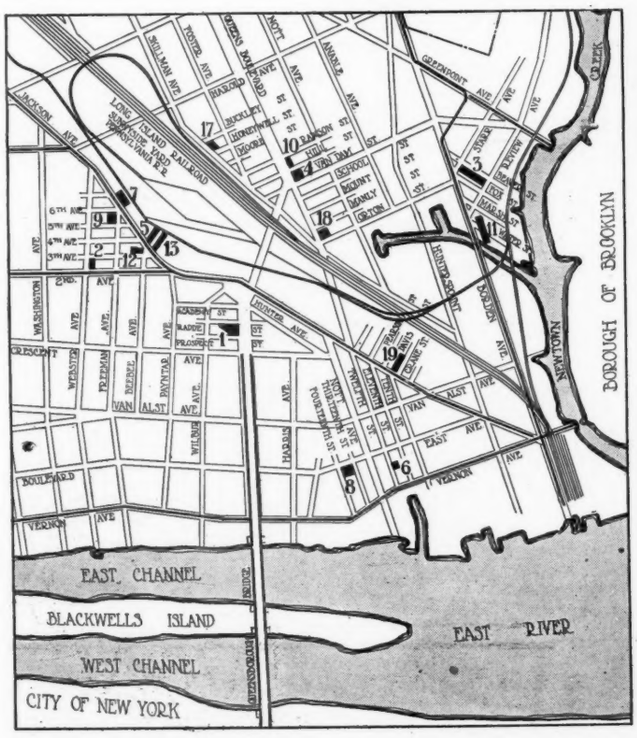
Above—Receiving floor of the Pierce-Arrow service station. Below—A section of the Ford service plant. Here the motors and transmissions are removed from the cars

recent date of construction, as they have all been built within the past 3 years, modern methods have been employed in their design. This is highly exemplified in the present Ford building where not only are the needs of service met but where at least fifty cars are being assembled a day and shipped on freight cars which are brought directly up to a loading platform. In this building there are facilities for assembling an entire car from the side members to the body in 20 minutes, and, as for service work, a car can be overhauled, including replacing of motor bearings and painting, in 8 hours.

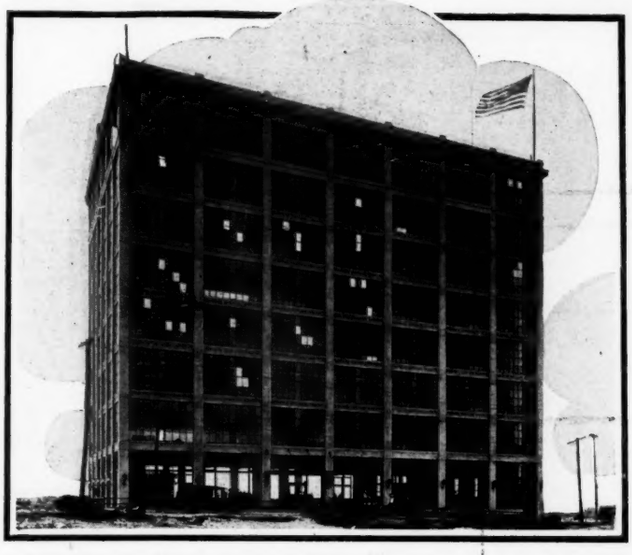
Another large part of the business done in these Long Island City plants in the dead storage of cars and bodies. At the plant of the Packard company, for instance, hundreds of owners leave their cars during the winter, while many others bring their cars to the service plants for an exchange of bodies. The storage spaces in this plant will be filled in the summer with hundreds of closed bodies, while in the winter the touring bodies will be stored. It is very often customary for the owner to bring the car to the plant or have it carefully gone over at the end of the summer and winter seasons, at the same time that the bodies are changed. The facilities for overhauling work in a plant of this kind are only designed to take care of cars made by one concern. That is, in the Packard service plant only Packard cars are looked after and the machinery installed is concentrated on this idea. The average time required to overhaul a car in the Packard plant is about 3 weeks, if no painting is done.

Investments Are Profitable

The rapidly growing value of the property in Long Island City renders the purchase of a service site a profitable investment. During the past few years property near the Bridge Plaza has increased in value at the rate of 16 per cent. a year. Its convenience is not equalled in New Jersey on account of the fact that the latter is not reached by bridges.



1—Brewster & Co. 2—Palmer & Singer. 3—General Vehicle. 4—Packard. 5—Ford. 6—Simplex. 7—Alco. 8—Benz, G. Piel and Maxwell. 9—Pierce. 10—Lozier. 11—Edwards. 12—Renault. 13—Goodyear. 14—Presto. 17, 18 and 19—Show proposed sites for service stations which are now being negotiated for

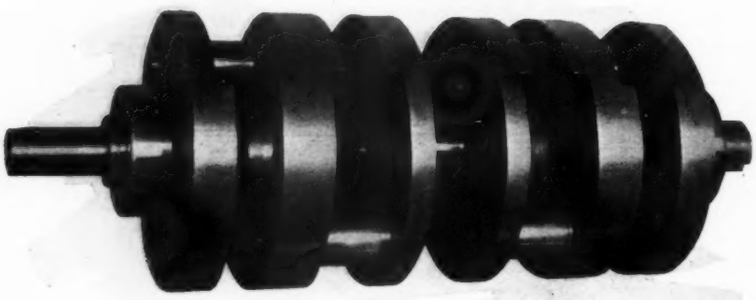


Building devoted to service of Packard car and truck owners

Galvin building wherein Renault and Maxwell owners are served

Building to be occupied by the Goodyear Rubber Co.

Maxwell Racers Have No Flywheels



The counterbalanced crankshaft which makes a flywheel unnecessary on the new Maxwell racers. The weight of each counterbalance equals that of the lower half of the corresponding connecting-rod and crankpin, so that all the rotating forces are completely balanced

Counterbalanced Crankshafts—Four Cylinder 140 H. P. Motor—Overhead Valves—17-Ounce Pistons—Reversed Oiling System

By L. V. Spencer

ON December 20 of last year Ray Harroun, of racing fame, entered into a contract with Walter E. Flanders, president of the Maxwell Motor Co., to build for the concern three racing cars to participate in the May 30 race at Indianapolis. The contract carried the stipulation that these machines must do a lap on the Indianapolis speedway in 1:37, or, in other words, since the track is 2.5 miles long, they must be capable of a speed of 93 miles an hour.

Harroun set to work in a corner of one of the plants of the Maxwell company in Detroit and on Friday of last week had the first of the three cars running. Actual construction work was commenced on March 1, and since that time Harroun's energies and those of his experienced corps of racing car mechanics have known no other purpose but to construct three mechanical steeds which, from all indications, will bring a good slice of the bacon home to the Maxwell stronghold.

Motors Develop 140 Horsepower

Built upon a 104-inch wheelbase, which is the same as that of the stock Maxwell 25, the Maxwell-Harroun racing cars have motors of unusual construction whose bore is 4.2 inches and stroke 8 inches. These dimensions give a piston displacement of approximately 445 cubic inches and provide 140 horsepower at 2,400 revolutions a minute.

The motor is easily the feature of the cars, although remarkable refinement of detail and careful attention to every constructional point is very noticeable.

With clutch and accessories, the complete motor weighs about 650 pounds, and perhaps the most unusual part of it is the fact that there is no flywheel, at least, not in the ordinarily accepted sense. The flywheel effect, however, is obtained by the counterbalancing of the crankshaft opposite to the connecting-rod throws. Thus the flywheel function is distributed along the entire length of the crankshaft and exceedingly fine mechanical balance is the result.

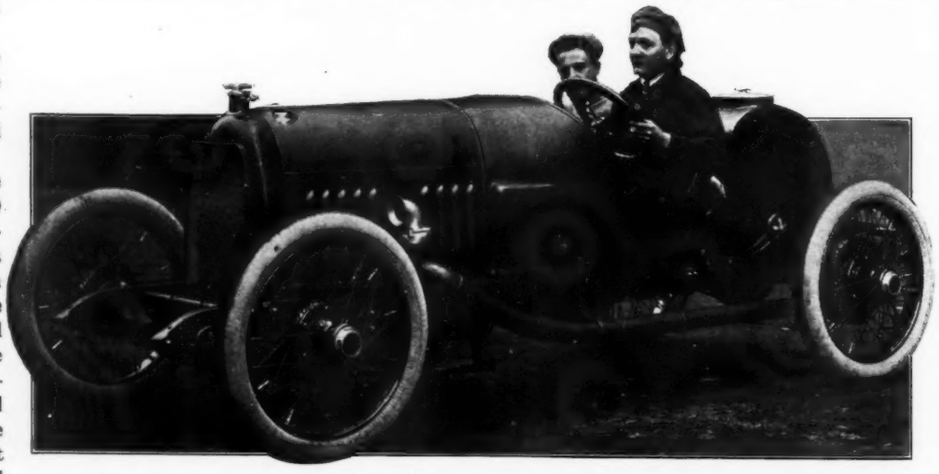
The counterbalance weights opposite each of the connecting-rod bearings is equal to the weight of the lower part of the connecting-rod and its bearing so that all of each portion of the moving parts revolves in the same plane. This gives to the crankshaft an unusual appearance, as shown in the illustration.

Cylinders Are Cast in a Block

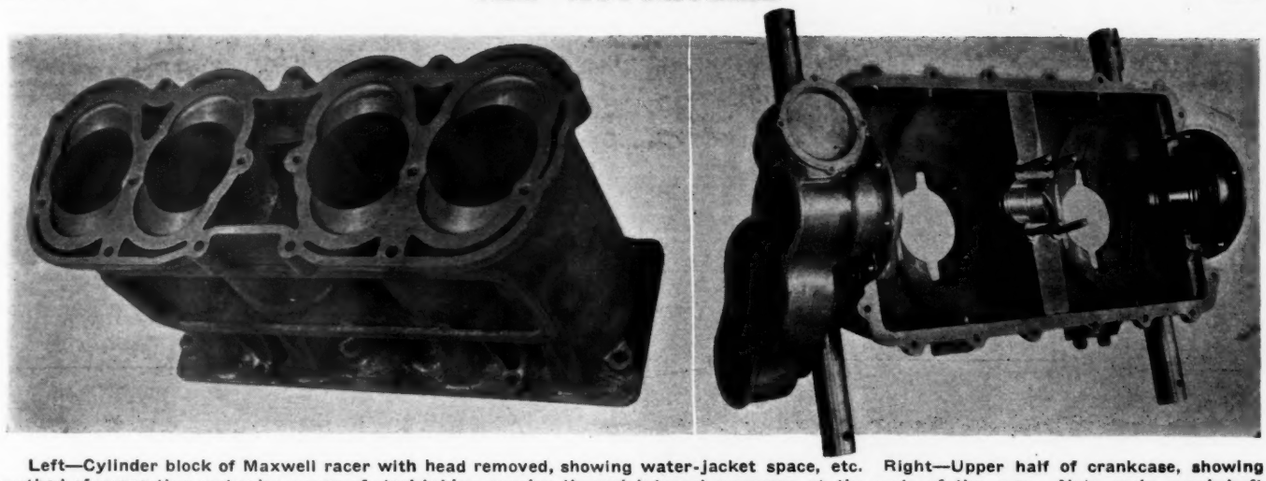
The cylinders are cast in one block and have very large water-jacket space so that efficient cooling may be readily obtained. The cylinder head is detachable and carries the overhead valves, which are operated by a single camshaft above them. The exhausts and intakes are on opposite sides of the engine and very clear, and short passages communicate with the manifolds.

The camshaft drive is by means of a vertical shaft running upward from spiral gear connection with the crankshaft to another spiral gearset at the camshaft. Both of these gear units are completely inclosed, while there is a universal joint at either end of the vertical shaft to allow for any slight variation in relative position of any of the component parts.

The camshaft is carried on three main bearings and operates the valves through the intermediary rocker arms, pivoted for exhausts and intakes on opposite sides of the inner walls of the containing housing in the cylinder head.



Teddy Tetzlaff at the wheel of one of the three racing cars which Ray Harroun and his corps of mechanics have constructed as the Maxwell Motor Co. entries in the 500-mile race at Indianapolis. Note flaring carbureter intake in path of onrushing air to increase charge weight



Left—Cylinder block of Maxwell racer with head removed, showing water-jacket space, etc. Right—Upper half of crankcase, showing method of supporting motor by means of steel tubing running through integral passages at the ends of the case. Note main crankshaft bearings, which are double row, self-aligning ball types at the ends, while the center is a plain bearing

In order to get both intake and exhaust cams on the same shaft, the set of two valves for each cylinder are offset from one another 1.25 inches. This allows the two cams to be arranged side by side and also gives plenty of room for the operating of the rockers.

The valves operate against springs in the usual way and have a clear opening of 2.75 inches. The intakes are on the left and the exhausts on the right. The whole valve mechanism, camshaft and drive are completely inclosed. An aluminum plate caps the cylinder head and thus allows for the efficient oiling of all parts.

Throughout the power plant, ball bearings are used with the single exception of the center main bearing of the crankshaft and the connecting-rods. These bearings are all double-row annulars of Rhineland make. The two main crankshaft bearings are self-aligning, which is another efficiency factor. These main end bearings are Nos. 6,312 and 6,311, rear and front, respectively, while the center bearing measures 2.5 inches in diameter by a length of 3 inches. One of these double row annulars is located next to each spiral gear on the camshaft drive.

Magnalium Pistons Weigh 17 Ounces

Connecting-rods and pistons of these Harroun Maxwells are very interesting, for the reason that they are constructed of metals not usually associated with such parts. The pistons are made of a very light but exceedingly strong alloy known as magnalium. They weigh 17 ounces, while the ordinary cast-iron piston of the same dimensions would tip the scales at between 2 and 3 pounds. Such material reduction of reciprocating parts is a great factor in increasing the power. These pistons are each fitted with two compression rings and one retainer ring for the wristpin. All have a width of .3115 inch and are constructed of steel.

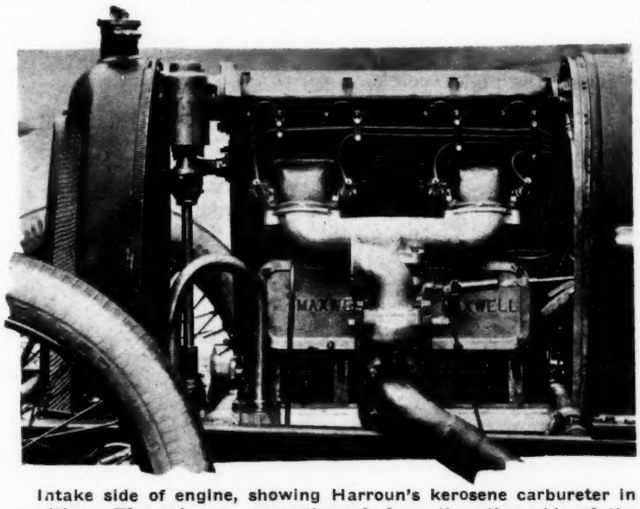
Connecting-Rods of Chrome-Vanadium Steel

The connecting-rods are examples of fine workmanship, and, being constructed of chrome-vanadium steel, have great strength. The usual I-beam rod section is preserved, but further strengthening is obtained by the web on either end of the I section. Four bolts hold the strap on the lower end in place, while the wristpin is loose on the upper end of the rod. The lower bearing has a diameter of 2.125 inches and a length of 3 inches, and the wristpin is .75 inch in diameter.

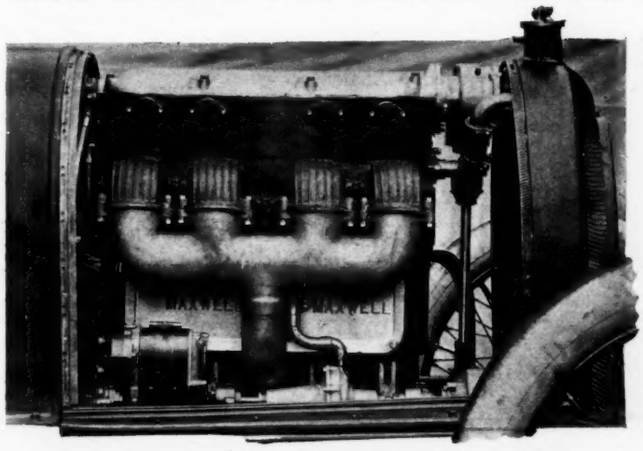
To secure the best possible balance due to uniform compression in all cylinders, the compression chambers are finished over all inside and polished. This insures the same size of each chamber.

Positive Oiling by Unusual Method

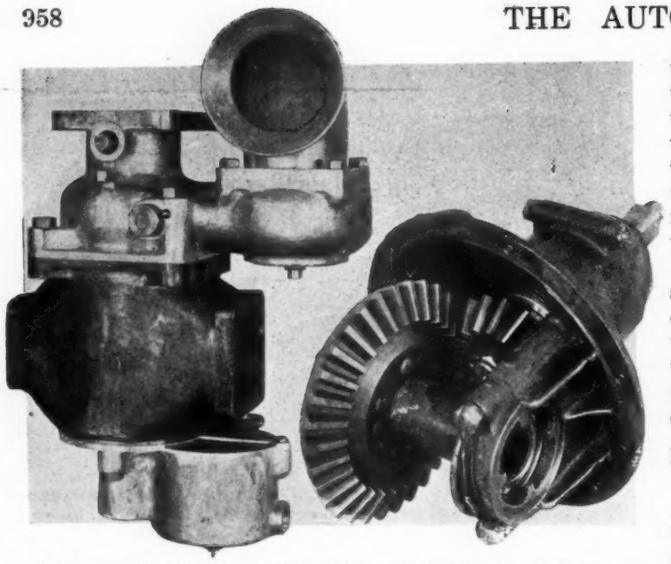
The motor has a novel oiling system. Instead of the usual arrangement for the pumping of oil into the crankcase, Harroun has provided a system whereby the lubricant moves in the opposite direction in its cycle from tank to engine and must be pumped out of the bearings. Thus, there is an assurance that the supply will not get shut off. The bearings may get too much oil, but they cannot get too little.



Intake side of engine, showing Harroun's kerosene carbureter in position. The exhaust comes through from the other side of the motor and passes around the carbureter before being led to the rear. It has not yet been definitely decided whether the kerosene carbureter will be used or not. Note complete inclosure of overhead camshaft and its drive at the front. Also position of spark plugs



Exhaust side of Maxwell motor, showing mounting of Bosch magneto at rear pump shaft. Note vertical shaft used for driving overhead camshaft and also how exhaust manifold passes through to the other side of the motor. No fan is used



Left—Harroun kerosene carbureter, which may be used on one or more of the Maxwell racers at Indianapolis on May 30, although this point has not yet been definitely decided. Right—Bevel gearing rear axle unit and differential

The oiling system is essentially a force feed pressure type circulating through the hollow crankshaft. It is pumped direct to the center main bearing from the rear tank by means of a gear-driven pump. The center main bearing is made of the plain type in order to get a packing joint for the introduction of the oil to its center. In the oil system there is a by-pass valve which is regulated from the dash. The lubricant by-passing through this check valve goes up through the hollow camshaft and out through the little holes in each of the cams, lubricating the cam rocker surfaces and cam surfaces. This oil then drains into the valve housing and is thence conveyed back to the tank. This flow back to the tank cools the oil ready for recirculation.

Motor Supported by Upper Half of Crankcase

One other unusual constructional feature of the engine is the method of support in the chassis. There is cast integral with the upper half of the crankcase at front and rear, a form of projection of tubular lug through which passes a hollow steel tube running to the frame. This makes an exceedingly strong and rigid mounting, and its general arrangement may be clearly seen in the view herewith of the upper half of the crankcase.

An interesting feature is noted in the carbureter construction as a flaring intake outside of the hood and directly in the path of the onrushing air is used. The advantages of this design are obvious, as the velocity of the air at the intake is equal to the speed of the car, which in a race will vary from 6,000 to 9,000 feet per minute, instead of zero when the ordinary type of intake located inside the hood is used. The result at high speeds is that the charge is literally forced into the cylinders and in this manner the charge weight and therefore the power is increased.

As to the ignition, Harroun prefers the single point type and has placed the spark plugs diagonally in the left side of the cylinder head and at either side of the inlet port which takes care of each two cylinders. Being in this position, the plugs are waterjacketed. A Bosch magneto on the right side of the engine and driven by shaft from the rear end of the water pump shaft takes care of the ignition.

Drive Is Taken Through the Rear Springs

Back of the motor there is a separate gearset of three speeds which gets its power through a disk clutch of standard type. The driveshaft has two universals, while the drive and the torque are taken through the rear springs. These are the first American racing cars to place the torque and drive on these rear springs, but it is in accord with some of the practice of foreigners, notably Peugeot and Delage.

The rear axle has a pressed steel housing, but there is no differential, a straight bevel gear and pinion construction connecting the power positively from motor to rear wheels. This, of course, is not new to racing machine construction.

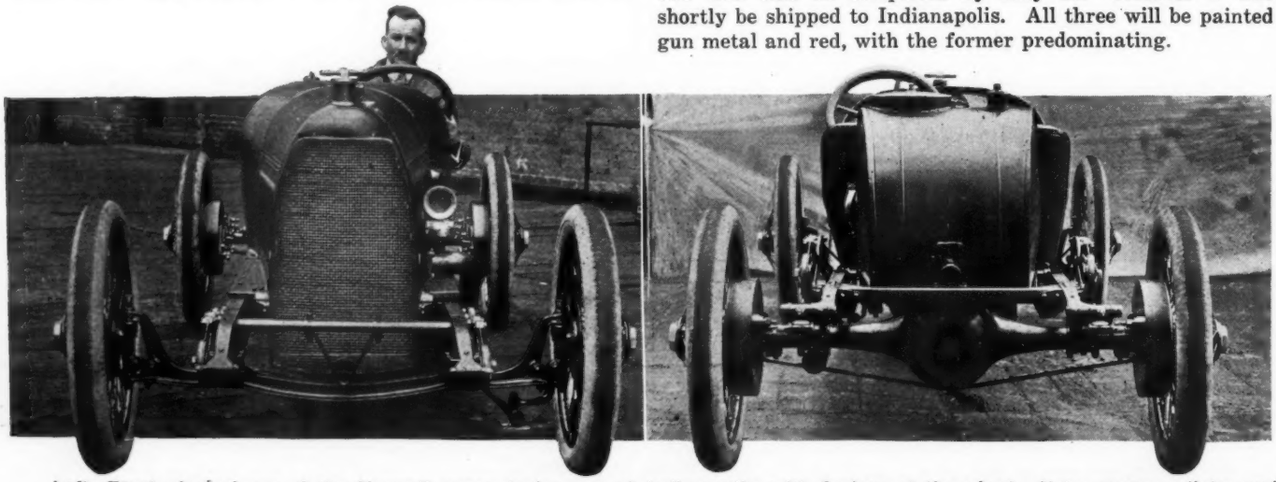
The tank, 32 gallons capacity for gasoline and 12 for oil, is hung on trunnions and has three-point support, allowing for any frame weaving without springing any of the tank seams or bending it. There are two front supports and one at the rear of this tank.

Tachometer Replaces Speedometer

Braender 34 by 4 1-2 tires on Houk wire wheels are part of the equipment. Another equipment feature is the use of a tachometer for registering the motor speed instead of a speedometer for car speed. Thus the driver can at all times know the performance of his motor, and knows from experience approximately what engine speed corresponds to a certain car speed.

The total weight of the Maxwells is about 2,100 pounds, and, of course, their speed possibilities are not yet fully known. But Teddy Tetzlaff and Billy Carlson are now in Detroit to find out a few things about them. Just who will drive the third car has not been fully decided, but negotiations are under way with Hemery.

Although only one of the cars is now on the road, the other two will also be completed by May 15. Number 1 will shortly be shipped to Indianapolis. All three will be painted gun metal and red, with the former predominating.



Left—Front view of one of the Maxwell racers to be seen at Indianapolis, with Carlson at the wheel. Note narrow radiator and streamline form of hood. Right—Rear view of one of the Maxwell racers. Note tapered form of tank to facilitate passage through the air at high speed. The drive is taken through the rear springs

Lunchroom of Firestone Tire Co. at noon-hour period

Practical Welfare In Motor Factories

Recreation and Meal-Time Periods Supervised as Well as Working Hours

THAT good may come from thorough selfishness is shown very clearly in the great advance in the health and efficiency of the workmen in many of the large automobile factories which have established outdoor recreation fields, lunchrooms, hospitals and other institutions of welfare and benefit to the workman. Actual production has been increased and along with that the men themselves are in a far better mental state to turn out good and skilful work.

The outdoor life of a man whose occupation calls for the spending of 10 hours daily in a machine shop becomes a matter of serious import not only to the man, but also to the company that employs him. For illustration, let us consider the screw machine hand who stands for .4 of his daily life before his machine. This man who turns out thousands of small parts is not only on his feet for this length of time but he is practically in one spot. At the end of 10 years he has been standing for 4 years, sleeping 3 years and spending the remaining 3 years in recreation and in eating.

The 4 years of work and the 3 years of recreation and eating are equally important to the company that employs this man. The remainder of his life is spent in sleep which automatically takes care of many of his bodily ills, but to make the 4 years of work as productive and effective as possible, the 3 years of recreation and eating should receive the attention of the employer and it is around this idea that the industrial betterment movement of recent years is centered.

Fields for Athletic Sports

For the outdoor or recreation period athletic fields have been donated by manufacturing concerns employing large bodies of men and various athletic teams have been organized in order to create the spirit of competition. The Packard company has organized a recreation league and donated property which gives facilities for baseball, football, tennis, trap shooting and other sports, besides providing room for an unlimited number of spectators who are in turn brought under the influence of the outdoor life and are exhilarated by the excitement of competition. The Chalmers company provides baseball grounds and tennis courts for the men and for the women and for those who desire rest, the factory buildings are skirted with large trees under which there are benches and settees where the employes may lounge during the noon hour.

In Cleveland the Peerless and White companies have baseball teams which are backed by the managements of both concerns and which not only bring the players outdoors but also many of their fellow workers.

Taking Care of the Sick or Injured

The injured workman is taken care of in nearly every factory in the country where any considerable number of employees are engaged. The larger automobile factories are all equipped with a hospital department where a surgeon is generally in charge and where all the repair surgery is done free of charge.

The workman who is sick is protected as a rule by a benefit association made up of the employees in the factory in which he is employed, or the factory in which he works comes under a state workmen's compensation law. The vehicle workers in Flint, Mich., have combined into one large mutual benefit association including practically all the employees in the following factories:

J. B. ARMSTRONG MANF'G CO.	LITTLE MOTOR CAR CO.
BUICK MOTOR CO.	MASON MOTOR CO.
CHAMPION IGNITION CO.	MICHIGAN MOTOR CASTINGS CO.
COPEMAN ELECTRIC STOVE CO.	W. A. PATERSON CO.
DURANT-DORT CARRIAGE CO.	W. F. STEWART CO.
FLINT VARNISH WORKS	WALKER-WEISS AXLE CO.
GREISSELL BREAD CO.	WESTON-MOTT CO.
IMPERIAL WHEEL CO.	

This organization is managed by a board of trustees composed of twenty-five trustees elected by the members. In connection with it there is a large club for which the dues are 10 cents per week. The insurance dues are 10 cents a week for $1 per day sick benefit and 15 cents for $1.50 daily.

Lunchroom facilities have been discussed in THE AUTOMOBILE in previous issues and the general good resulting from them has come to be recognized, in spite of the fact that there are some people who believe that they do not accomplish their object. The entire difference between the food secured by the company and that furnished by the small lunchrooms which generally surround a plant employing a large number of men is that the company does not seek to make money on the proposition while the lunchroom naturally does.

Cooking Is an Important Feature

The food is better cooked in the factory lunchroom because it is generally prepared under the direction of a competent chef. The result of the better food and the better preparation is in the better condition of the workman and this not only results in better work but actually is a great remover of discontent as it is a well established fact that a large amount of the mental discontent of the human being originates in disorders of the stomach due to poor food.

APPLICATION FOR INSURANCE

Having accepted employment with the Associated Factories, and being in good health, I hereby agree to become a member of the FLINT VEHICLE FACTORIES MUTUAL BENEFIT ASSOCIATION, and to abide by its Constitution and By-Laws. I also authorize the Factory named below to deduct my dues from my wages.

FACTORY No. Clock No.

INSURANCE DUES—Class A Per Week 10c
Class AA Per Week 15c CLUB DUES—Per Week 10c

SIGN HERE (Full Name)

Flint Address: No. Street Date 191

Reason for not wanting insurance

Application blank for insurance in the Flint Vehicle Workers Assn.

Power or Silence Decided by Cams

Contours Generally a Compromise with a Strong Leaning Towards Silence in Last Few Years

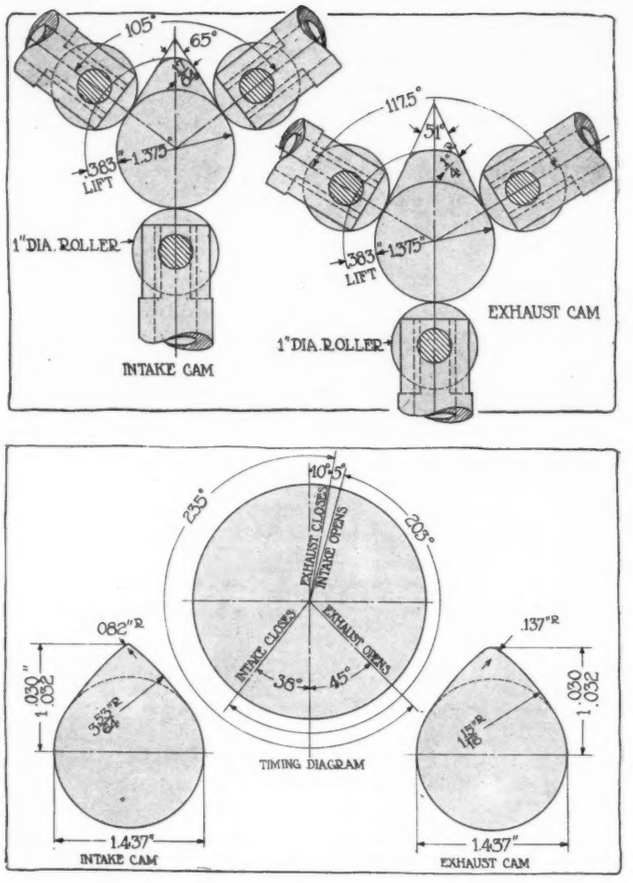
VALVE timing must be determined for the speed at which the motor is to produce its greatest torque and in automobile motors the speed at which this is desired is between 800 and 1,400 revolutions per minute. This consideration renders the timing element a matter of trial and error until the correct chart is found for the particular motor upon which the engineer is focusing his attention. If one desires a motor for a racing car to develop the greatest amount of power regardless of speed, and naturally this motor would run at high speeds, the proper valve timing and camshaft would not be correct for low speed motor in which great pulling power for hill climbing work is necessary and in which the high speed consideration does not matter much.

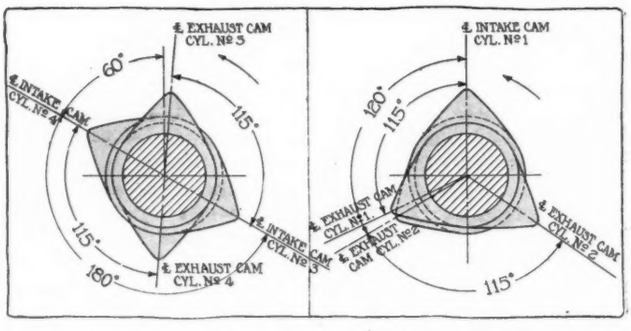
Back of the valve timing question, lies another and this is the actual mechanism which carries out the timing portrayed in the chart. Starting from the crankshaft drive we find power delivered to the camshaft by spur gears, helical gears or silent chain and thence the drive is carried through the cam to the valve actuating mechanism of the poppet motor. The relation between the drive of the crankshaft and camshaft is the fixed half time reduction and hence requires no extended amount of consideration. In the cam itself, however, there is an element which cannot receive too much thought and attention.

Cam Design a Compromise

In general it may be said that the design of a cam is a compromise. On one hand, we have the requirements for power and on the other the requirements for silence. Hence, it is that we find the cam of a raceabout or pure racing model to be of much different contour from that used in the touring car. The tendency in the touring car model of recent years is to lean strongly on the side of the silence factor, thus sacrificing a percentage of power but gaining a percentage in silence. Illustrative of this an engineer of a company building thousands of motors annually, states that in laying out their cams originally their aim was to get as much power as possible, but in the last few years they have been giving special attention to quietness. The cams they use are illustrated in Fig. 1. Another concern which has its motors in a large proportion of the successful cars for this season states, "We also took into consideration in designing the cam that it should produce quiet cam action. This is not possible in a cam which produces a quick opening and likewise quick closing, in other words producing a wave which would rise suddenly, run along flat and drop suddenly. We try to accomplish as near as possible this result and at the same time produce a quiet action." The cams of this company together with the timing used are shown in Fig. 2.

Still another concern which specializes in motors and whose output is used largely by successful automobile manufacturers, states that the design of their cam is a compromise between a pure harmonic motion and a quick opening, and that they use harmonic motion for opening and closing as near as they possibly can. These cams are shown in Fig. 3. Of somewhat similar profile but straighter in the side are the cams shown in Fig. 4. These are the product of another concern which specializes on motors and are like all others a compromise between the matter of securing the maximum power without any greater sacrifice of silence than absolutely necessary. Other examples of cam design which bring out the efforts of designers to meet this puzzling problem are shown in Figs. 5 and 6. In the latter illustration the timing used with the cams is also furnished.

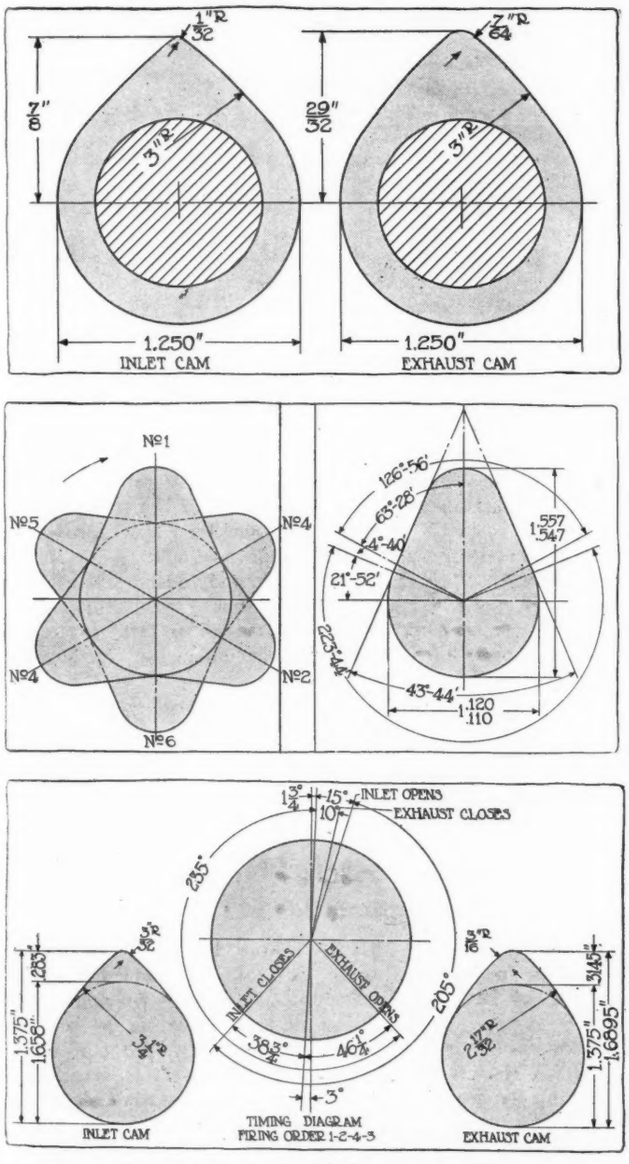



℄ EXHAUST CAM CYL. Nº 3
℄ INTAKE CAM CYL. Nº 4
60°
115°
℄ INTAKE CAM CYL. Nº 3
℄ EXHAUST CAM CYL. Nº 4
180°
℄ INTAKE CAM CYL. Nº 1
120°
℄ EXHAUST CAM CYL. Nº 1
℄ EXHAUST CAM CYL. Nº 2

Figs. 1, 2, 3—Cams and timing adopted by motor specialists

In the charts mentioned which are representative of the practice of the highest authorities in gasoline engine design in the country, it cannot fail to be remarked silence requirements had been given first attention. In none of the cams shown is there any marked use of the flat sided cam which gives the quickest lift; but all are either of tangential design or keep closely to the harmonic action which provides for silence. As a cam starts to actuate the valve lifting parts there is always a hammering action which cannot be avoided. The shock of the cam against the follower and the follower in turn against the end of the valve stem produces a noise which increases as the speed of the motor increases. Then at the higher speeds it frequently happens that the velocity of the cam is such that it leaves the follower and then the latter, under the action of the valve spring, itself becomes a hammer and the follower brings up against the cam with a distinct knock.

It has come to be general practice that the one piece camshaft is used in the average automobile motor. The objections to keying the cams to the camshaft are centered around the fact that regardless of how well this work is done the cams are always subject to the tendency to become loose. While the chances of looseness are perhaps the prime consideration in the adoption of the unit camshaft, it is also a fact that the integral design is a cheaper proposition for the manufacturer. The material from which the camshaft is made must be given the same amount of care as the crankshaft, and examples of the material may be mentioned. One concern uses a .15 to .25 carbon low sulphur and phosphorus steel which is pack-carbonized and afterwards hardened. The core of the shaft is refined with heat treatment. Another manufacturer uses .15 to .25 carbon steel drop forgings and requires that the hardening be to a sclerescope reading of 80 to 85 before grinding. The Locomobile Co. uses a nickel steel camshaft of which only the cams are hardened. Another automobile company uses .20 carbon steel case hardened and ground all over. The latter concern also uses roller push rods of the same steel with a tool steel roller. The push rod has a bearing of 3 square inches and runs in gray iron guides.



Figs. 4, 5, 6—Contours of typical cams for poppet valves

The use of carefully selected and treated metal is necessary because any whipping or distortion in the camshaft would be disastrous to the performance of the motor. For this reason the shafts are uniformly of large section and are carried on bearings of sufficient area to give a rigid support to the shaft. Cam deflection through the distortion of the shaft destroys all the good of careful cam design, puts an excessive wear on the push rod bushings, destroys the camshaft bearings and gives irregular motor action. The lash between the cam, push rod and valve stem should not exceed by even a small amount of .003 inch. It is general practice to carry the camshaft on three bearings, the center and rear bearings being as a rule of smaller dimensions than the front bearing because the latter supports the strains and weight incidental to the driving of the camshaft through the timing gears.

One motor maker may be taken as an example of practice in the dimensioning of camshaft bearings, in order that the proportion may be noted. The rear bearing is 13-16 inches in diameter by 1.5 inches long, the center 1.875 inches in diameter by 1.25 inches long, the front bearing is 1.875 inches in diameter by 2.25 inches long. The center and rear bearings are lined with die-cast babbit while the front is made of a high grade phosphor bronze to take the strain of the drive. The camshaft used in this motor manufacturer's product is a 15 to 20 point open hearth steel, carbonized and hardened to a depth of 1-16 inch; they are then rough-ground and afterwards finish ground, time being allowed between the rough and finished grind to relieve the internal stresses in the metal. The rigid construction is carried out by making the camshaft in one piece with the cam hubs 1.25 inches across and the shaft between the cams 1 inch in diameter. The cam faces and bearings only are finished, the shaft being left in the rough. The bearings are held to a limit of plus or minus .00025 inch and the cams are held to a plus or minus limit of .005 inch. The cams are designed to run with very slight clearance between the tappet and valve.

These camshafts are all tested for hardness before they are placed in the stock room and are examined for soft spots. Should any of these occur which are below 65 hard on the scleroscope they are thrown out as the makers have found that with the flat tappet it is absolutely essential to have the cam surfaces exceedingly hard in order to prevent wear. The tappets also are made hard and run in iron bushings which are pressed into the cylinder base. The bottoms of the tappets are ground square with their axes and in this way the clearance is always the same even when the tappet turns around in running, which is invariably the case.

Valve Area Enters Question

Naturally in the design of the cam which determines not only the lift of the valve but the length of time that it is held open the question of the size of the valve is a potent factor. One engineer who has reached the conclusion that a valve 1.5 inches in diameter with a lift of 11-32 inch produces the greatest power at normal engine speeds, states that he disagrees with many of the engineers who believe that large valves are a necessity. He says:

"We find that beyond a certain point of the normal running condition of the motor additional valve opening does not do any good, and it is perfectly reasonable to consider this to be true from the fact that the volumetric efficiency of the motor does not depend entirely on the valve passage resistance, but is also due to the carbureter, and when you consider that the valve passage resistance is only several ounces, whereby the well known carbureters introduce air resistances which run up to two pounds, or in other words, reduce the air pressure entering through the valve from 14 7-10 pounds to 12 7-10 pounds then you can readily see that the valve resistance is only partly responsible for the decrease in the volumetric efficiency of the motor."

This is somewhat at variance with the efforts of many of the manufacturers who are clamoring for the 2-inch valve.

Lubricating the High-Speed Motor

The Automobile Engineers' Forum

Europe Leads in Advance Methods of Oiling the Modern Automobile Engine—Tendency Toward Pressure Feed

NEW ROCHELLE, N. Y.—Editor THE AUTOMOBILE:—The combination of the tendencies toward long stroke and high rotative speeds have introduced into the lubrication problem some factors which are taxing the ingenuity of the designer. In my opinion it is a mistake for these designers to attempt to cling to the splash method of oiling with these new motors. It is necessary to allow the oil to reach the upper part of the piston under a certain amount of pressure with these high-speed motors and the splash oiling system I do not believe to be capable of doing this at all speeds.

As Europe has led America in the introduction of the high-speed motor, so it is leading in the methods of lubrication of motors of this design. We find that cars made on the other side are rapidly dropping the splash method of lubrication and where they do not drop it, it is modified to such an extent that it becomes at best a combination of pressure and splash feed. The lubrication of the high-speed motor by a direct pressure system we therefore find to be a recognized necessity in Europe.

The system which seems to be finding favor with many engineers is to bring the lubricant from the crankshaft under pressure through a hollow connecting-rod and wristpin and thus to the wall of the cylinder, as illustrated in Fig. 1. This system does not violate any of the rules of good engineering and in fact allows the oil to follow the path of least resistance since it is greatly aided by the centrifugal force generated by the throw of the cranks. When running at speeds of 1,500 revolutions per minute or more, the centrifugal force at the ends of the cranks is considerable. Thus it is readily forced up the connecting-rod and flows naturally through the hollow wristpin to the cylinder wall.

Allows for Changes in Motor Speed

This system of lubrication has the desirable feature of increasing the supply of oil almost in direct proportion to the speed of the motor. Not only the amount of the oil is increased but the pressure under which it is fed. This can be very favorably contrasted with the results obtained by the splash system in which the cylinder is very often given too much oil at low speeds while at high speeds it is starved. There is no greatly added complication to the pressure system as the simple plunger pump which takes care of the feeding of the oil is a piece of mechanism which rarely gives trouble and when it does its ills are readily remedied by the aid of a little packing. It makes all the difference in the world to the economical action of the motor when the oil is fed in a haphazard manner or when it is under the direct control of the operator.—M. F. BRONSVELD, M. E.

Tomorrow's Car To Have Light Pistons and Big Valves

SYRACUSE, N. Y.—Editor THE AUTOMOBILE:—The automobile of today is powerful, reliable and enduring to a degree unthought of a few years ago. The chassis design and spring suspension have been improved until the consequent ease of riding amounts to positive luxury and conveniences in starting and lighting have been added almost without number. Indeed it would seem that we had arrived at practical perfection, but after deliberation the reader will agree with me that there yet remains much to done along practical and economical lines.

We are hearing a great deal these days about conservation of our national resources and I submit to the reader that it is along the line of conservation of energy that the greatest advance will come in the automobile of tomorrow. Today we attain power by piston displacement, tomorrow's engine will be of moderate size with lightened reciprocating parts, big tungsten valves and two-point ignition. The power output will be ample and the number of miles per gallon will be considerably more than now.

I look to see the lighting and starting equipment banished from under the hood and placed beside the transmission assembly. This will give a more accessible motor with ample elbow room for making adjustments. Spiral gears will be used in the rear axle and more adequate provision for inspection will be provided. A somewhat higher gear ratio will be used than now and four speed transmissions with direct fourth. Tomorrow's motor car will take any reasonable hill on high and average 15 miles a gallon so we will not use a two-speed rear axle for we do not need it for economy and do not want the extra weight and complication. Of what avail is it to gain even 20 per cent. increase in miles per gallon and add greatly to the unsprung weight in the rear axle with consequent increase in tire wear, to say nothing of the complication of the gearshift. I believe that the trend of the future will be in the direction of a simpler car with six-cylinder motors dominating the field above $1,500.

We have about reached the limit in body design but an improvement might be made along the line of adjustable seats, following the lead of the Stevens-Duryea in this respect.

We have come a long way in the development of the modern automobile and the buyer who purchases any one of the well-known makes can count on a reliable and efficient servant which will respond to his every whim. It will be a thing of beauty when new and while not a joy forever can be counted upon to give years of service and grow old gracefully.—HUGH BRYAN, Chalmers Syracuse Co.

Tests Show Generator Increases Fuel Consumption 3.8 Per Cent.

NIAGARA FALLS, N. Y.—Editor THE AUTOMOBILE:—The fact that a great deal of discussion has been centered of late on the amount of gasoline consumed by electric starting and lighting devices, leads us to believe that the results of a series of tests recently conducted with the U-S-L electric starter and lighter, with the object of determining the cost of operation in terms of gasoline required, will be of interest to you and your readers.

It may be well to state here for the enlightenment of those not familiar with U-S-L design that the armature, or

rotating member, of the U-S-L single unit motor-generator is bolted directly to the flange of the engine crankshaft in place of the cast-iron flywheel. The armature is of flywheel size and weight, performs flywheel duty in addition to its other functions, and revolves, of course, with the engine all the time the latter is running. The starting power is thus applied directly to the crankshaft without necessity for gears or chains. When the starting button is pressed with the foot, current flows from the storage battery and causes the motor-generator to operate as a starting motor and to spin the engine at from 150 to 400 revolutions per minute. When the cylinders commence to fire the starting button is released, and the motor-generator is automatically converted to a generator driven by the engine. The total absence of gears and chains eliminates all friction loss, so that the gasoline required does useful work in producing electrical energy, and is not in part wasted in overcoming resistance in transmission devices.

Conditions of the Tests

The tests were made on a stretch of road between Niagara Falls, N. Y., and Buffalo, N. Y., which offers a very excellent test course. The car used had an engine of 30 horsepower, four cylinders 4 1-2 by 5 inches. Four runs were made, each with a measured gallon of gasoline and under two conditions; first, two runs, one in each direction with the motor-generator in operation; second, two runs, one in each direction, with the motor-generator inoperative. During the four test runs an average speed of 25 miles an hour was maintained.

With the generator delivering maximum energy, the car ran 11.85 miles on 1 gallon of gasoline. With the generator inoperative, the car ran 12.3 miles on 1 gallon, or 3.8 per cent. farther.

Therefore, to operate the generator .08 gallons of gasoline were required per hour, or 3.8 per cent. more gasoline was used with the generator working than without.

In other words, the generator will deliver maximum energy for 12.5 hours on 1 gallon of gasoline. At 25 miles per hour the car will travel 312.5 miles in 12.5 hours. Therefore, at 19 cents per gallon for gasoline the cost of operating the system is 6 cents for 100 miles, or 1 cent for 17 miles.

At the cost of 1-17 of a cent per mile the car owner gets electric light, the twentieth century illumination, and in addition he presses a button to start his engine instead of wrestling with a crank in the mud and slush.

So much for gasoline consumed. How many people stop to consider the amount of gasoline saved on a starter equipped car? We have it from an eminent English engineer that the U-S-L electric starter and lighter on the Sheffield-Simplex car is responsible for an average increase in mileage of a little more than 2 miles per gallon. The reason for this lies in the fact that a car without a starter consumes a large amount of gasoline without covering any mileage. A person is prone to leave his engine running when the car is to stand idle for a short time, because of the trouble and labor involved in hand-cranking. The engine if stopped must be started before the driver is in position; also the engine is generally run at a high speed before the driver has time to throttle it. It is easy to see that at the end of a year, a considerable amount of gasoline will have been wasted that might have been saved.—C. A. MUDGE, Engineer, Starter and Lighter Dept., United States Light and Heating Co.

Fuel Economizers—Some Advantages and Disadvantages

NEW YORK CITY—Editor THE AUTOMOBILE:—The increasing popularity of various forms of gasoline fuel economizers calls for a discussion of the merits of these devices, and I would like to see the arguments for and against them stated, both from the varied experiences of the users and the manufacturers.

While at first glance the gasoline fuel economizer seems like a makeshift instrument the fact that so many types have sprung up shows that there must be good reasons for their introduction and it would be interesting to obtain exhaustive opinions through the Forum to show just what they are designed to do, what they are intended to accomplish and whether their existence is not the result of inadequate carbureting devices.

In one sense the fuel economizer is merely a dash adjustment on the carbureter that is only capable of weakening the normal running mixture since it is a device that allows extra air to be taken into the intake.

Now let us discuss the action of the economizer under different conditions of carburetion.

Economizer No Use with Lean Mixture

With a carbureter that is adjusted to supply a mixture of minimum richness over all ranges of speeds, one that will give maximum economy but lessened power, then there can be no advantage in fitting an economizer, as more air would cause the motor to miss under the conditions assumed. However, in actual practice it is next to impossible to obtain a carbureter that will give a charge of uniform weakness at all throttle settings and with the ordinary carbureter set for maximum fuel economy there will be certain points at which a richer mixture than is desirable will be furnished, and therefore to make up for the shortcomings of the carbureter an economizer might be used to advantage.

We come now to consider the carbureter that either through its design or adjustment, does not supply a uniform mixture at all throttle settings and speeds. This carbureter will supply more or less lean charges at some speeds and rich charges at other speeds. If this carbureter is adjusted to give maximum power under the former conditions then the mixture will be too rich at all other points. This defect can be remedied by the use of an economizer.

However, the average driver is not as anxious to obtain maximum economy as he is maximum power and therefore a carbureter setting that will give this result will be used for ordinary running, in traffic where a lively motor is desired and in hilly country where power on the hills is wanted. But when long stretches of smooth level road are encountered a saving can be made by using a weaker mixture than normal and this can be simply effected by the use of an economizer. To sum up, when a carbureter is capable of supplying a mixture of maximum power under all conditions of operation, the only advantage in fitting an economizer is to obtain better economy on good roads.

The economizer is of no aid in starting.—R. F. C.

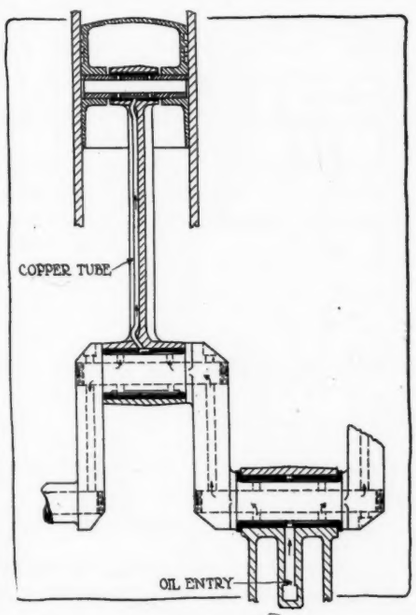
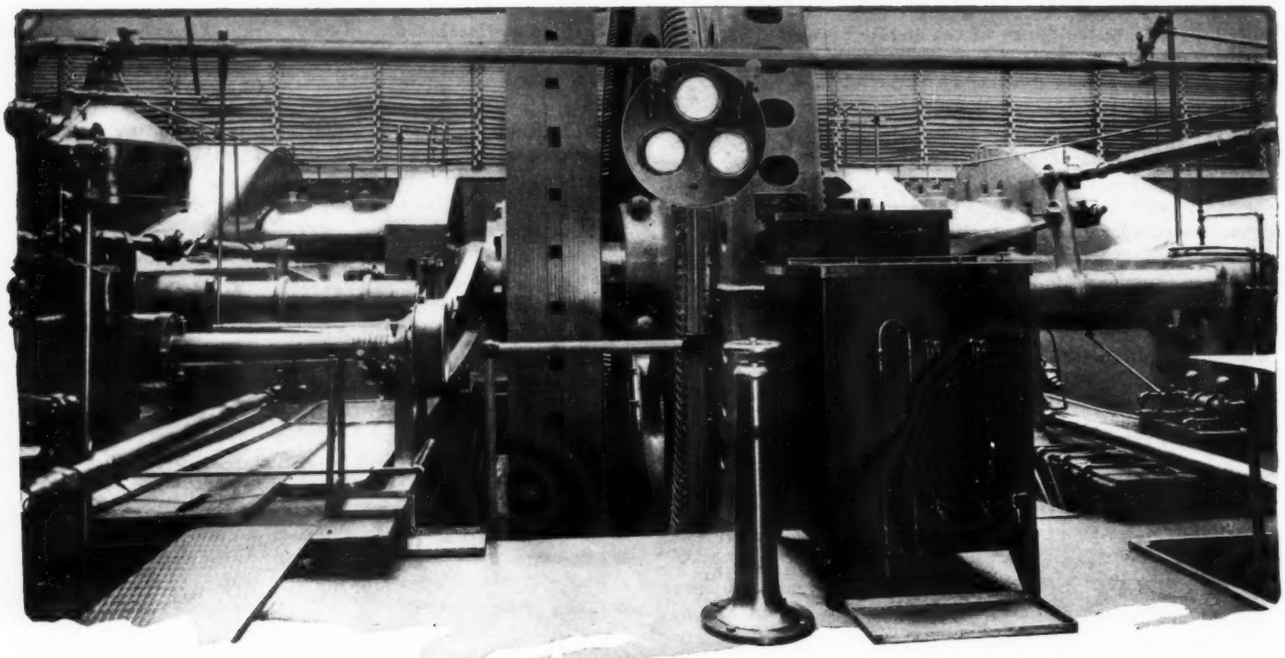


Fig. 1—Cross-section through hollow crankshaft and connecting-rod, illustrating one method of lubricating a high-speed motor



Richardson Phenix individual oiling and filtering system used in Thomas B. Jeffery plant

Oil Economy in Jeffery Plant

Installation of Filtering Outfit Permits of Perpetual Use of Same Lubricant—Results of Tests Made on Similar Plant at McAlpin Hotel Show Good Results

At the plant of the Thomas B. Jeffery Co., Kenosha, Wis., there are installed two complete individual oiling and filtering systems supplied by the Richardson Phenix Co., of Milwaukee, Wis. One of these supplies lubrication to the 2,200-horsepower engines in the power house of this plant and another takes care of the needs of a 1,500-horsepower unit. The remarkable part of the duties of these oiling systems is not directly in the lubrication of the engines but is in the economical method of reclaiming the oil and using it perpetually, it being necessary only to add enough to replace that lost through evaporation and direct leakage.

One not infrequently hears engineers speak of oil wearing out. Many even going so far as to say that oil after being used for a certain time should be discarded and replaced by new oil. In order to determine exactly what deterioration oil suffers when in constant use, the Richardson Phenix Co., maker of the plant used in the Jeffery power house, have had a series of tests made at Cornell University, which show that if oil is properly filtered it can be used over and over again without losing any of its lubricating qualities. The tests which are herewith described were taken on the plant of the Hotel McAlpin, which is a similar installation to that of the Jeffery Company.

On the motor generators used in the Jeffery plant, the oil is pumped from an oil filter to an overhead sight feed oiler, from which it is fed to all the bearings by gravity feed. The oil runs from the bearings into an oil well or settling chamber below the engine and thence back to the original filter. The whole system is controlled by one pump which operates from the engine.

With this system a 1,500-horsepower engine consumes about 6 gallons of lubricating oil per month. By the old cup-oiler method 125 gallons a month were consumed. This represents a saving of over 2,000 per cent., exclusive of the fact that, in the old system, the services of an extra man were required merely to carry oil.

The McAlpin plant supplies flooded lubrication to four Wetherill engines having forty-eight points of lubrication, two Clayton air compressors having two points of lubrication, two Laidlaw compressors having sixteen points of lubrication and one Wetherill crank and flywheel pump having thirty-two points of lubrication, making a total of 134 lubri-

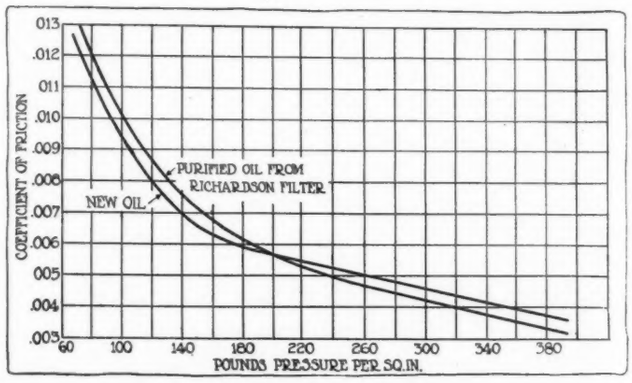


Fig. 1—Co-efficient of friction of new oil compared with oil from filter

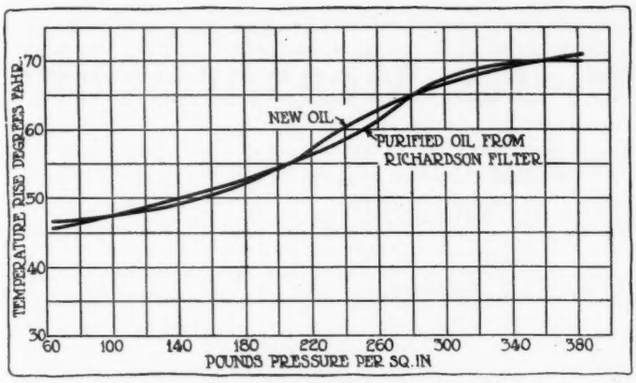


Fig. 2—Comparison of the tendencies to heat of old and new oils

cating points. The plant operates 24 hours a day, the average temperature of engine room being 100 degrees Fahrenheit and the oil a mineral base known as extra brand engine oil. The average amount of oil used by the lubricating system is 150 gallons per hour or 3,600 gallons per day, an equivalent of 1,800 barrels per month. With the Richardson system it is only necessary to add three barrels of oil per month to supply that lost by shrinkage and what is drawn off for hand oiling purposes.

Test To Determine Changes

In the Cornell University test a sample of new oil as received in barrels from the manufacturers was secured and also a sample of the oil drawn off from the clean oil compartment of the filter. These two samples were the basis of the series of tests made and of the results given in the tables and in Figs. 1, 2 and 3. These tests would seem to prove that an oiling and filtering system results in a direct economy of the oil consumed.

The first tests were for friction and were made on a Thurston railroad lubricant tester having a hardened steel journal and bronze bearings with a total area of 20 square inches. In all tests the testing machine was run at a constant speed of about 360 revolutions per minute and the load applied in increments of 1,500 pounds total pressure of 75 pounds per square inch. Oil was fed upon the side of the bearing through a sight feed oiler at constant speed and readings were taken at 10 minute intervals. The summary of the test is shown in the following tables:

SAMPLE A—NEW OIL

Press. on bearing, total lbs.....	1,500	3,000	4,500	6,000	7,500
Press. on bearings, lbs. sq. in..	75	150	225	300	375
Duration of test, minutes.....	120	50	60	60	50
Temperature of bearing, max....	114.5	120.0	129.5	139.0	143.5
Temperature of room, aver....	68.2	70.7	71.5	72.5	73.0
Diff. in temp. bearing and room	46.3	49.3	58.0	66.5	70.5
Rate of feed, drops per min. aver	34.8	38.4	33.6	37.0	38.2
Speed, R.P.M.....	362	361	361	361	359
Speed, ft. per min.....	355	354	354	354	352
Minimum coeff. of friction.....	.01166	.00666	.00533	.00458	.00373

SAMPLE B—PURIFIED OIL FROM RICHARDSON FILTER

Press. on bearing, total lbs.....	1,500	3,000	4,500	6,000	7,500
Press. on bearing, lbs. per sq. in.	75	150	225	300	375
Duration of test, minutes.....	150	60	60	80	50
Temperature of bearing, max....	120	125.5	132.5	144.5	147.2
Temperature of room, aver.....	74	74.8	75.3	77.0	77.5
Diff. in temp. bearing and room	46	50.7	57.2	67.5	69.7
Rate of feed, drops per min. aver.	38.9	40.3	37.4	40.5	41.4
Speer, R.P.M.	363	363	360	361	358
Speed, ft. per min.....	356	356	353	354	351
Minimum coeff. of friction.....	.01265	.00717	.00522	.00458	.00367

The co-efficient of friction in the above table represents the lowest value found for each load, representing the value that would be obtained in ordinary practice where engines operate continuously for an hour. The temperature readings are the highest reach for each load and taken after the bearing has reached its running temperature. The difference in temperature between the bearing and the room have been plotted in the curves shown in Fig. 2. Curves showing the co-efficient of friction both of the new and filtered oil are shown in Fig. 1.

This oiling system as a whole has been in operation for over a year and a half and the question which naturally arises is what physical change, if any has the oil undergone during this period. The tests to determine this are given in the following table:

PHYSICAL PROPERTIES

SAMPLE A—NEW OIL

Color—Medium red, translucent.
Flash point—410° (open cup).
Burning point—460° F. (open cup).
Specific gravity at 60° F. water as 1 = .895.
Viscosity (with Olsen viscosimeter)
Water as 1 at 60° F. Time 27.9 secs. for 100 cc.

Temperature F.	Time 100cc. secs.	Relative Viscosity
70	97.0	3.48
70	96.6	3.46
71	96.2	3.45
97	59.8	2.14
94	61.8	2.21
130	45.6	1.63
132	43.8	1.57
214	34.0	1.22
215	34.2	1.225

SAMPLE B—PURIFIED OIL FROM RICHARDSON FILTER

Color—Very dark red, opaque.
Flash point—410° F. (open cup).
Burning point—440° F. (open cup).
Specific gravity at 60° F. water as 1 = .903.
Viscosity (with Olsen viscosimeter).
Water as 1 at 60° F. time 27.9 secs. for 100 cc.

Temperature F.	Time for 100 cc. secs.	Relative Viscosity
68.0	138.0	4.94
69.0	134.0	4.80
70.0	130.2	4.66
103.0	60.4	2.16
114.0	50.6	1.81
130.0	45.2	1.62
152.0	39.0	1.40
147.5	40.2	1.44
218.0	33.2	1.19

The viscosity readings have been plotted in the form of a curve, shown in Fig. 3.

From the table it is evident that the oil has gained in specific gravity through constant use. This is what one would naturally expect inasmuch as the oil, in passing through the bearings has had some of its more volatile constituents driven off, also a small quantity of cylinder oil used for lubricating the connecting-rods and stuffing boxes naturally finds its way into the oiling system. The viscosity curves also confirm this hypothesis as the tests show that the used oil has a higher viscosity than the new, clearly demonstrating that as oil is used over and over again in an oiling system it actually gains in body provided, of course, the filter thoroughly removes entrained water and this is the vital point of the whole system.

The results of the friction tests as shown in Fig. 1, are also consistent with these physical changes. It will be noted that the new oil has a slightly lower coefficient of friction on low bearing pressures while the purified oil shows a lower coefficient on higher bearing pressures. This is due to the fact just noted. In other words, the old oil, having more body, is better able to maintain a lubricating film when subjected to higher pressures. Of course the difference between these two curves is so slight that one can say that for all

(*Continued on page* 968)

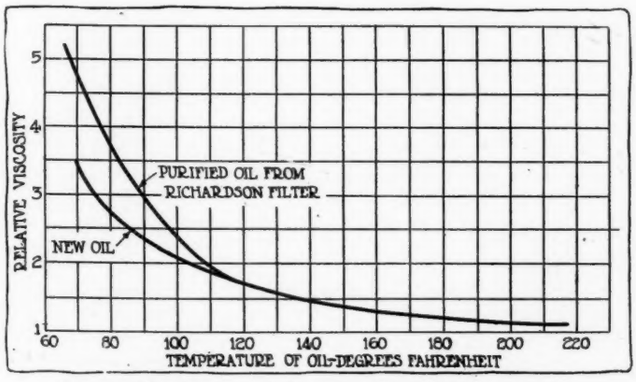


Fig. 3—Viscosity of old oil higher than that of new oil

Compression Pressure—Its Measurement

Results Obtained by the Use of the Okill Pressure Indicator on Typical Examples of Modern Engines

By John Okill, Inventor of the Okill Indicator

Part II

IF the compression pressure varies in individual cylinders of the same engine, combustion conditions and the work done in each cylinder will also vary, the net effect being: lack of uniformity in turning moment at the crankshaft and to some extent through the whole transmission system.

Assuming carbureter conditions are correct, that is, that it is large enough and gives an economical charge, fuel inefficiency, or low power output reckoned on cylinder dimensions may be due to incorrect valve timing or ignition, or to both, or it may be due to unequal distribution of gas to the cylinders. Compression pressure (and weight charge per stroke) is affected directly by either incorrect valve timing or unequal gas distribution, and these defects can only be determined by direct pressure measurements at various crankshaft speeds.

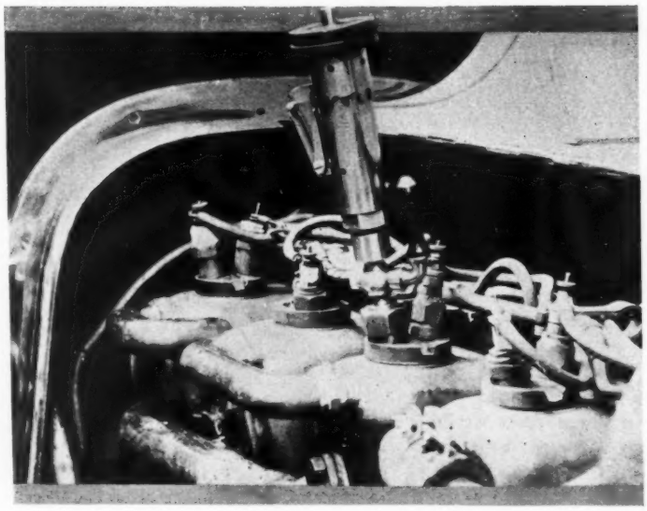


Fig. 5—Special mounting used in connection with the indicator

For the very interesting series of compression and explosion pressures here tabulated, the author is indebted to L. H. Pomeroy of Vauxhall Motors Ltd., England. These figures show the pressure conditions in the cylinders of a modern high-class gasoline engine, at different crankshaft speeds and with full throttle opening. They are the most complete series yet published and will doubtless prove of value to engine designers and testers.

Compression and Explosion Pressures in a Four-Cylinder Vauxhall Motor

COMPRESSION PRESSURES POUNDS PER SQUARE INCH

Fan Dynamometer Positions	Revolutions per minute	Cylinders 1	2	3	4
4	2,100	76	75	79	81
5	1,800	89	88	88	92
6	1,440	94	93	93	94
7	930	87	88	87	93
8	750	88	90	88	90

EXPLOSION PRESSURES BY OKILL INDICATOR

	R. P. M.	Pounds per square inch			
4	2,340	320	322	320	354
5	2,100	360	386	368	390
6	1,700	414	440	436	440
7	1,140	410	414	434	428
8	900	412	412	366	394

It might be argued that the compression pressure readings, especially at high rotative speeds do not necessarily prove that the gas compressed is a mixture of the same quality as that taken into the cylinders at lower speeds. For instance, at high speeds the back pressure at the end of exhaust might be greater than at lower speeds and although the compression pressure as measured at these high speeds may be practically the same as at low speeds, the compressed gas would conceivably be diluted with a greater proportion of exhaust products.

With regard to this point, the author would remark that with his instrument the compression and combustion pressures have to be taken separately, that is when measuring compression pressures the mixture is not finally ignited, and thus no account is taken of back pressure at exhaust.

The only way to determine whether dilution of the compressed charge is occurring at high speeds is to take explosion readings as well as compression pressure readings. If the explosion pressure falls without a corresponding reduction in compression pressure, then throttling of exhaust and dilution of the ingoing charge may be occurring and causing a falling off in power, or ignition is faulty.

In the Vauxhall results given here it will be observed that the pressure ratios, $\frac{\text{Explosion}}{\text{Compression}}$ do not show a dimunition at high speeds, thus indicating that, although there is some wire-drawing of the ingoing mixture at high speeds, its quality is uniform and the scavenging good.

The ignition of highly-compressed mixtures when fired by magneto is much more certain at speed than by coil and accumulator, and although a magneto spark is of shorter duration, it is less influenced by compression pressure and is of much greater intensity at high speed than is the induction coil spark. The following results obtained by the author with an ordinary coil and spark plug, not specially adjusted, show how this system may become unreliable due either to low voltage at accumulator, incorrect spark-gap distance or faulty adjustment of trembler coil, etc.

Compression Pressures and Spark-Gaps With Coil and Accumulator System = Length of Spark in Atmosphere = .313 Inch

Compression Press. Lb. sq. in.	Distance between Plug-Points Inch	Compression Press. Lb. sq. in.	Distance between Plug-Points Inch
34	.065	67	.030
40	.055	80	.025
52	.045	100	.015
60	.035		

The pressures are those at which the spark was in reliable existence for the given distances between the plug points.

As a wipe contact is generally fitted in conjunction with a spark advance gear in the above system, it is obvious that if the arc of contact on the contact breaker is long enough, the ignition may automatically retard itself to some extent.

What is more likely, however, is that the ignition lever may have to be retarded in order to get consistent firing. Thus ignition will take place when the engine piston is well on the expansion stroke, that is, the equivalent to a lower compression.

It is easy to test whether the spark is failing at full compression, by running the engine at normal speed and advancing spark until ignition either ceases altogether or causes the engine to knock.

Pressure Loss Due to Manifold

Carbureter manifold systems that comprise a number of branch pipes need to be carefully designed, in order that each cylinder shall receive the same weight of gas and thus compress it to the same pressure.

If the manifold system is at fault it is, of course, useless to attribute loss of pressure to leaks that apparently cannot be made tight. The author has tested engines in which this feature did exist, the pressure varying cyclically in each cylinder of the set, even under constant revolutions and fixed throttle position.

The modern method of petrol engine construction, where two or four cylinders are cast together, and the carbureter attached by a short induction pipe to gas passages of large area, is advantageous because it insures uniform distribution of gas to each cylinder.

Such an arrangement is well shown in the accompanying illustration, Fig. 4, of an Argyll single-sleeve-valve engine. Through the kindness of Messrs. Argylls Ltd., of Alexandria, Dumbartonshire, the author is able to reproduce this photograph, together with a series of compression pressures showing features of interest in connection with both the sleeve and poppet valve engines made by this well known firm.

The pressures given were obtained with an Okill gauge and show the uniform compression pressure in the sleeve-valve cylinders at high speeds. It will be observed that the pressure falls more rapidly in the poppet valve engine, due to wire-drawing of the charge.

Compression Pressures in the 12-Horsepower Four-Cylinder Argyll Engines, Pounds per Sq. Inch

REVS. PER MIN.	SLEEVE VALVE	POPPET VALVE	REVS. PER MIN.	SLEEVE VALVE	POPPET VALVE
500	79.0	77.5	1,200	80.7	80.0
600	79.3	78.2	1,400	81.0	79.3
800	80.0	79.0	1,600	80.3	77.0
1,000	80.5	79.8	1,800	79.0	72.5

Engine designers determine the compression pressure of an engine by deciding on the compression ratio. This ratio is:

$$\frac{\text{Volume of compression space + stroke volume}}{\text{Volume of compression space}}$$

Now the relation between the pressure and volume of the gas during compression in a gasoline engine cylinder follows the equation $P.V^{1.33} = \text{Constant}$. Knowing then the compression pressure, the compression ratio C may be determined, or *vice-versa*, within fairly close limits for a gas-tight cylinder. Thus the compression pressure Pb resulting from a compression ratio of 4, assuming atmospheric pressure Pa at the commencement of the compression stroke, would be obtained thus:—from

$$Pa\ Va^{1.33} = Pb\ Vb^{1.33}$$

$$\log Pb = \log 14.7 + 1.33 \times \underline{.6021} - 0.$$

$$= 1.968$$

$$\text{Antilog } 1.968 = 93.0 \text{ lb. per sq. inch absolute.}$$

$$= \text{Approx. } 78 \text{ lb. per sq. inch gauge.}$$

The following results of tests made with an Okill indicator are extracted from *The Gas Oil and Petrol Engine*, Vol. II, by Dugald Clerk and G. A. Burls (Longmans Green & Co.):

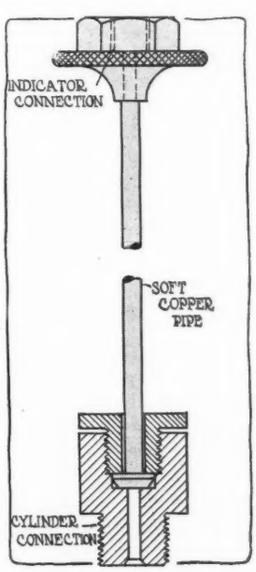
A four-cylinder, 40-horsepower Wolseley engine, with a bore of 5 inches and a stroke of 5½ inches; flat-topped combustion chamber, valves side by side; the volume ratio of compression being 4.17; and the corresponding compression pressure (calculated), 98½ pounds per square inch absolute, was tested by an Okill gauge, at about 1,000 revolutions per minute, and a compression pressure of about 100 pounds per square inch absolute was recorded.

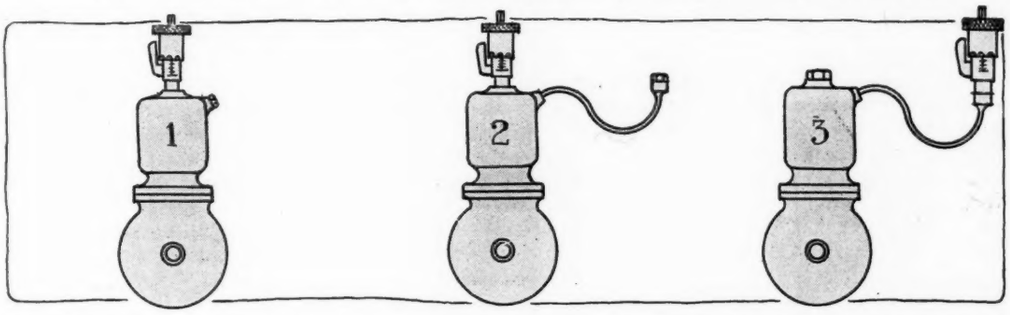
With the four-cylinder Vauxhall engine, with a bore of 80 millimeters, or 3.15 inches, a maximum of 38 brake horsepower occurred at 2,700 revolutions per minute, by an Okill gauge. The compression pressure was 82 pounds per square inch. This is an example of pressure measurement at high rotative speed.

With the four-cylinder Vauxhall engine, bore 90 millimeter, stroke 120 millimeter, tests showed a compression pressure of 98 pounds per square inch at 1,000 revolutions per minute.

The foregoing experiments were made by Messrs Vauxhall Motors, Ltd. in 1910.

Citing the accuracy with which actual compression pressures may be measured, Messrs. Clerk & Burls state that, in the case of a 5 by 5½-inch engine running at 2,000 revolutions per minute with C = 4.2, the Okill gauge showed a pressure of 99 pounds per square inch absolute, which is exactly the same as the calculated pressure. Again, in a 4 by 4-inch engine, at 1,400 revolutions per minute with C =





1—Indicator directly connected to cylinder.

Speed.	Compression Pressure.
600 r. p. m.	49 lb. per sq. in.
1200 r. p. m.	51 lb. per sq. in.

2—Indicator directly connected to cylinder. Copper pipe 14″ long x 5/32″ bore, one end connected to cylinder, the other end closed.

Speed.	Compression Pressure.
600 r. p. m.	46 lb. per sq. in.
1200 r. p. m.	47 lb. per sq. in.

3—Indicator at end of copper pipe.

Speed.	Compression Pressure.
600 r. p. m.	50 lb. per sq. in.
1200 r. p. m.	50 lb. per sq. in.

Fig. 4—Left—Fittings for flexible connection for use with Okill indicator. Fig. 6—Right—Experiments to determine the effect of a connecting pipe between the indicator and engine of 75 millimeter bore and 80 millimeter stroke

4.7, the gauge recorded a compression of 110 pounds per square inch absolute, the calculated pressure being 115 pounds per square inch absolute.

Using a Flexible Connection

When testing the compression pressure of an engine mounted in a chassis standing on its springs and tires it is sometimes difficult to adjust and read the indicator, owing to engine vibrations. This is not generally the case, but it is also sometimes inconvenient to connect the indicator directly with the cylinder to be tested owing perhaps to lack of space in which the instrument may stand or to the small plug connection available being too weak to support the indicator. In any case a flexible connection will be found convenient on some occasions, and the usual arrangement of fitting is as shown in the diagram Fig. 5, the instrument being held in the hand while it is being adjusted for pressure readings. Referring to Fig 6, tests 2 and 3 show the effect of adding a length of copper pipe to the clearance volume.

Test 1 was made with the indicator directly connected to the cylinder and thus the compression pressures given are exact. In test 2 the copper pipe was open to the clearance volume, thus increasing it somewhat, the compression pressures consequently being lower than in the first experiment. In test 3 the indicator was attached at the end of the pipe and it will be observed that the pressures recorded are practically the same as in the first experiment. It should, however, be noted that the true compression in the cylinder is 3 to 4 pounds per square inch lower than the observed pressure, the higher pressure at the end of the tube being due to inertia of the column of gas in the connecting tube.

In most cases only a few inches of connecting pipe are required and thus the increased pressure at the end of the connecting pipe or the reduced pressure due to increased clearance volume may be neglected. Further experiments are being made to investigate the effect of long pipe connections on the recorded pressures and these will be published shortly.

In all the foregoing experiments the engine was driven at the respective speeds by an electric motor, the throttle opening remaining unaltered during the tests.

In *Some Experiments on a Diesel Engine* (Proc. Inst. C.E., Vol. 179, p. 352) Messrs. Fisher and Wood used a specially designed Okill indicator to obtain the correct compression pressure in a Diesel engine cylinder of small size and having an extremely small clearance volume. In view of the interest in the question of available sources of power, the authors decided to test the Diesel engine with alcohol as fuel, to determine the compression required and the efficiency obtained.

A diagram indicator was first tried, but on opening the indicator cock the effect of the increased clearance volume was to cause the engine to misfire. The diagram indicator gave the compression pressure as 560 pounds per square inch whereas the estimated pressure was about 700 pounds per square inch. The Okill indicator which did not add to the clearance volume gave the pressure as 730 pounds per square inch, the instrument having been carefully calibrated on a Crosby gauge tester. To obtain the compression pressure, as the engine was single cylinder, it was driven by a motor. All the compression pressures for the various tests were checked in the same way and a curve drawn connecting clearance volume with compression pressure.

The Diesel type Okill indicator as now made is calibrated to read pressures up to 1,000 pounds per square inch.

Oil Economy in the Jeffery Plant

(*Continued from page* 965)

practical purposes, properly filtered oil is as good a lubricant as new oil under all operating conditions.

The curves shown in Fig. 2 are probably the ones that will be most interesting to the operating engineer, as it is usually by the temperature of the bearings that he determines the quality of lubrication. As will be noted, these curves are practically superimposed and in no case is the variation more than a few degrees so that here again it is proven that filtered oil is as good as new oil.

Principles of Filtration

Referring to Fig. 3, it will be seen that if the oil is heated to a temperature of about 150 degrees, its viscosity is only slightly higher than that of water even after the oil has been in service a long time. Now, if oil at this temperature could be spread out in a very thin film, entrained water and other impurities which are heavier than oil would settle out very rapidly. Of course, it is impossible to spread the oil out very thin in a commercial filter handling large quantities of oil, as the size of the filter would be prohibitive.

The dirty oil is first heated as it passes into the filter, after which it is carried to the bottom of a precipitation compartment where, by a novel arrangement, the oil is spread out to an area of about 14 square feet, but this compartment only occupies 2.5 square feet of floorspace. The velocity of the oil in passing through this precipitation process is reduced to .2067 feet per second. This extremely low velocity allows plenty of time for the precipitation process to be carried out in a highly efficient manner. The importance of thoroughly separating entrained water from the oil is demonstrated by the fact that at the Hotel McAlpin about 4 gallons of water per day is automatically separated and ejected from the several precipitation chambers of the filters.

The oil after being separated from entrained water and heavy particles of foreign matter in the precipitation chamber then passes directly to the filtering chambers, each of which contains twelve filtering units having a total filtering area of 3.5 square feet. On this basis the filters are handling at the rate of 2.4 gallons of oil per square foot of filtering surface per hour.

The fact that a power plant like that in the Hotel McAlpin could pay for less than two-tenths of 1 per cent. of the amount of oil used and that oil can be purified in a commercial filter and returned to an oiling system in a state of purity equal to the new oil, is certainly of vast importance in the economical operation of power plants, and the old-fashioned idea of purchasing a barrel of oil and letting it drip to waste is certainly as out of date and uneconomical as Watts' original scheme of condensing the steam directly in the engine cylinder. The saving in the cost of the oil in the above plant by the use of the oiling system amounts to over $2,000 per month.

Hardening Steel with Compressed Air

The usual methods of hardening steel in oil, water and other special baths produce a great tension along the line of contact between the hardened and unhardened parts. A recent German improvement on this process is the use of a number of jets of compressed air playing on the hot steel. The zones of cooling are graduated beautifully by varying the number and spacing of the openings in the nozzle. A wide range of results is possible by adapting the shape of the nozzle to that of the work.

Europe's 1914 Carbureters Improved

Modifications to Obtain Better Idling Mixtures —Exteriors Simplified

By R. W. A. Brewer

PROGRESS in European carbureter design during the past year has been in the direction of increased refinement. Attention has been given to the small details. Modifications in the slow speed jet design are noted in several instances, to obtain smoother running at slow motor speeds and especially when the motor is idling.

The aesthetic side of carbureter construction has also come in for attention. Changes in several models have been made merely for the purpose of simplifying the exteriors in order to improve the appearance, and other makes have introduced modifications for the purpose of reducing the size or increasing the facility of mounting.

In distinction to American practice, where the auxiliary air inlet is the rule, Europe employs combinations of jets to effect perfect carburetion at varying speeds, and all the principal makes are found equipped with two or more jets.

Descriptions of the new features of the principal makes, most of which are on the American market, are given below.

Accurate Fit of Parts a Zenith Feature

The Zenith vertical model 36 millimeters is this dimension on the gas outlet and the cast gunmetal throttle passes across this area. The notable feature of this throttle is its size and the width of its bearing face, which is made fuel-tight when new. The ends of the throttle where the spindle goes through are manufactured in a special machine in order to insure an accurate fit. A 5 millimeters bearing face is formed all around the edge of the throttle and great stress is laid upon the accuracy of fit of this member. The slow running stop has been redesigned which makes a particularly neat arrangement.

Take, for example a motor of 90 millimeters bore by 120 millimeters stroke. In this, the diameter of the choke would be 20 millimeters, the main jet would be 0.90 millimeters diameter, and the compensator 1.10 millimeters diameter, but there is no definite relation between the size of the main and the compensating jet. In order to obtain slow running, the fuel which is in the starting well, and level with the float chamber, enters a hole, B, Fig. 1, of 0.45 millimeter diameter in the bottom of the tube surrounding the dip tube, to which all fuel and some of the air enters the body of the instrument through a hole in the vicinity of the throttle.

The whole of the air which goes up the dip tube enters a small hole 0.8 millimeter diameter in the side of the outer tube which shrouds it, this hole being near the top. On opening the throttle any fuel in the starting well enters the external annular jet as its area is bigger than that of the main central jet hole. The compensator, which has a diameter of 1.10 millimeter, is always acted upon by a fuel head of 38 millimeters, but as the outlet from this is of large size and is open to the air flow, there is no tendency for retardation of the flow of fuel through the compensating jet as the fuel gets away as soon as it has issued. The main jet in this combination being 0.90 millimeter diameter communicating direct with the float chamber, is apparently somewhat small for the size of instrument, but it must be remembered that this instrument works under a high depression, and at maximum speeds the velocity of air through the choke tube is anything up to 500 feet a second, the length of the choke tube is 50 millimeters and the outside diameter of the jet tube is 6 millimeters, so that it is obvious that there is a considerable restriction in the throat of this instrument. The main air outlet is 36 millimeters diameter, and it is probably owing to the high velocity of air past the jet, that this instrument is enabled to work satisfactorily in a horizontal position. The float chamber has a diameter of 74 millimeters and a height of 65, with a double-dished float, 70 millimeters diameter and 44 millimeters deep operating the taper fuel needle by means of toggles in the usual way.

The horizontal Zenith is arranged to have a gas speed of anything up to 800 feet per second in the small engine of the 1,100 cubic centimeter size. The cyclecar model is nominally 22 millimeters diameter in the throttle chamber with a 26-millimeter diameter at the outlet. The choke tube is 13 millimeters diameter, of which the jet occupies 6 millimeters of vertical height by 6 millimeters outside diameter. In combination with the 13 millimeters choke, the main jet is 0.60 millimeters diameter and the compensator 0.70 millimeter.

A very neat arrangement is designed for the slow running which virtually consists of a complete small carbureter in itself, Fig. 2, and the effective area of what is virtually the choke can be altered easily at will by means of a saw-cut in the top end of the central tube, A, which forms the choking tube. This can be raised or lowered over the small jet tube which enters the starting well.

Polyrhoe Is Now Vertical

The Polyrhoe carbureter has undergone an important modification and is now made vertical. This rearrangement has considerably reduced the size of the instrument as it has enabled the large dashpot to be eliminated. In the present nominal 40 millimeter T type, for example we have an outlet of 47 millimeters in which a butterfly throttle is fitted. The fuel jets are now arranged vertically in place of horizontally and consist of a large number of thin brass disks 19 millimeters diameter, each one having twenty-one holes placed through it of 1.4 millimeters diameter. One hole in each disk is slotted out through the periphery by means of a slot 0.7 millimeters wide, in this size of carbureter, and proportionately for other sizes according to the width of the air groove, and the gasoline passage is up the center of these holes.

Wherever one hole is slotted out the gasoline is enabled to pass to the carbureter mixing chamber by this slit. Now when these disks are threaded on their retaining stem they are located by a peg which passes through one hole, and the arrangement of the slots is in the form of a double spiral,

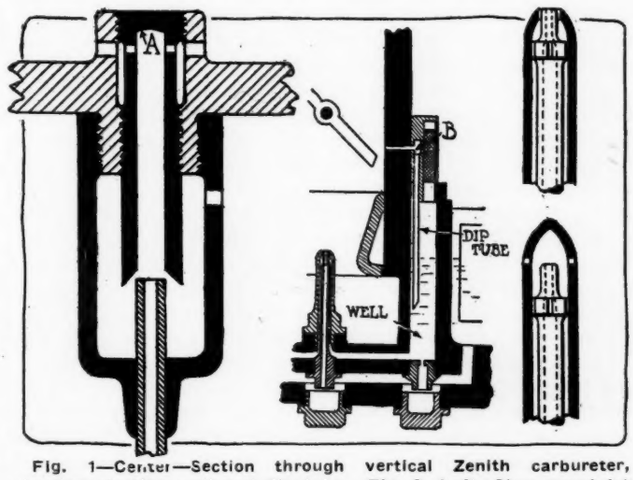


Fig. 1—Center—Section through vertical Zenith carbureter, showing starting well and dip tube. Fig. 2—Left—Slow speed jet on horizontal flow Zenith. Right—Two types of jets

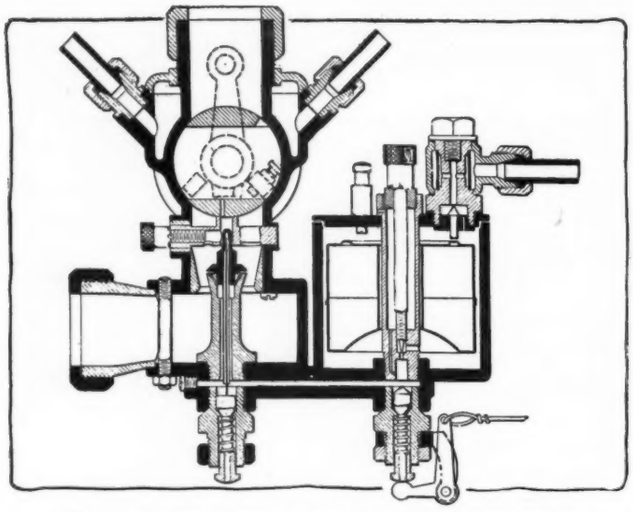


Fig. 3—Section through new Longuemare carbureter

there being more apertures or jets at the early part of the throttle opening than at the latter part or high-speed position. By this means the mixture strength can be varied for any particular opening of the air and fuel sleeves.

The actual air passage up the center is 62 millimeters in diameter with a central masking sleeve for the jet rings, which is 24 millimeters diameter outside, having three arms fixing this masking sleeve to the floating member. The length of the pile of disks is 35 millimeters and the air inlet ports which are two in number are 42 millimeters wide by 32 millimeters high when giving their maximum lift at maximum opening.

In this instrument the net area upon which the suction of the engine works is given by a diameter of 68 millimeters, and in normal working only about one-half of the full area of the air ports is employed, the remainder being available for purposes of adjustment. The float chamber is 56 millimeters diameter by 80 millimeters long, and the float 54 millimeters diameter by 55 millimeters long with double-dished ends. A vertical fuel needle and toggles acting on the top of the float are employed. The dashpot action is now obtained by the air piston, a small bypass with screw adjustment being provided. In order to obtain a variation of mixture strength, the air sleeve can be rotated by means of a movable plate fixing it into the base operating the sleeves through a long finger.

Variable Float Chamber on New White & Poppe

The White & Poppe carbureter for the 3-liter size of motor and upwards is a new type, the principal feature of which is the variable position of the float chamber with regard to the carbureter body, the passage from one to the other being by means of a long hollow bolt having a clearance forming the way for the gasoline passage. The jet is now made flat on the surface and it will be remembered that this type of instrument consists of a large central jet over which a sleeve works, the two having eccentrically-placed fuel holes. In the new model this jet only stands up 10 millimeters from the bottom and is 25 millimeters diameter outside. In the past some difficulty has been found when opening the throttle at times of pick-up, by reason of the retarding effect of the air stream upon the fuel jet as the air swept across the top of the fuel orifice. Now a copper blanking strip is fitted which rotates with the jet top in order to mask the air stream from impinging directly upon the top of the jet. The maximum air opening of the inner throttle is a diameter of 35 millimeters on the engine side, and on the main connection is 45 millimeters on the engine side. On the inlet side the inner throttle is 32 millimeters and the hole for a hot air pipe, if required, is 50 millimeters diameter. It is now possible to arrange the slow running stop so that the main air inlet of the jet can be completely shut off and fresh air allowed to pass to the carbureter by means of the top by-pass; this may be desirable under certain conditions. The float chamber has an inside diameter of 75 millimeters and is 65 deep, the float being 69 millimeters diameter and 43 millimeters deep, both ends dished. The fuel supply is controlled by toggles on the top of the float and a taper needle, a loose cap being fitted over the needle for the purpose of flooding.

Stewart Precision Has Four Air Ports

The Stewart precision carbureter of a nominal 1 1-4-inch, has a 31-millimeter outlet and is suitable for engines up to 85 millimeters bore or of 3 liters capacity. The rearrangement of the air ports is the principal modification, and redesign of the valve head. In place of the single air port at one side this instrument is now fitted with four air ports ranging round the base of the air valve; these are 32 millimeters long by 17 millimeters wide. The central air and fuel stream now sprays up on a flat under-side of the valve head and is diverted to a knife-edged outlet just above the valve seat, and at right angles to the main air inlet flow. The depression in the mixing chamber is now about 8 inches of water head. The main floating valve is 45 millimeters diameter on its seat and weighs 350 grams, from which the depression can be calculated, and is slightly less than used to be the practice last year. The central fuel tube at its upper end is about 7 millimeters below the head of the valve, and this point is again 55 millimeters above the fuel level in the float chamber, so that when cranking the motor by hand, a suction equal to a fuel head of 55 millimeters has to be produced before the fuel rises out of the jet orifice. This instrument is now fitted with a metal float in place of the cork float and this acts directly upon a brass-tapered fuel needle located in the main body of the instrument. The system of retaining the needle in place without occasioning fuel leakage has been modified, and the leather washer which is now fitted is caused to jamb in its place in a dove-tailed groove.

Longuemare Has Removable Choke Tube

The 26 millimeters Longuemare, Fig. 3, is a two concentric-jet type fitted with a barrel throttle of 26 millimeters diameter having a gas outlet of the same size, the air inlet being 29 millimeters diameter, at its other end. A peculiar formation in the air inlet is that it is reduced just below the choke tube to a diameter of 20 millimeters in a length of about 20 millimeters. The actual area through this instrument can be varied by means of a removable choke tube, but as an example, in the 26 millimeters model the maximum area through the main body is equal to that of a diameter of 24 millimeters hole and in this diameter, choke tubes can be fitted from 18 to 20 millimeters diameter at the narrowest contraction of the venturi. The last year's features of the Longuemare are in this latest model supplemented by a neat arrangement of cleaning needle for the pilot jet. This needle passes downwards from the jet orifice and projects through the bottom of the instrument where it passes through a stuffing box in the bottom nut. The needle is pressed up by hand when operated and returned to its usual position by means of a spring plunger.

As an example of sizes of instruments for various engines taking the four-cylinder engine up to 80 millimeters bore, we have the 26 millimeters gas outlet instrument as just described, up to 90 millimeters bore would have a gas outlet of 30 millimeters diameter, 100 millimeters bore engine, a gas outlet of 34 millimeters, and up to 114 bore the gas outlet would be 41 millimeters in diameter. It must be noted that in this case the diameter of the gas outlet is given and not of the minimum choke of the venturi, which is naturally

some millimeters smaller in comparison to the sizes just given for the 26 millimeters model. An important addition is provided in this instrument in order to enable the driver to shut off the fuel supply at will, by means of a hand-actuated plunger, fitted in the bottom of the float chamber, which can cut off the fuel supply completely.

The throttle can then be opened full in order to provide an air scavenge without any communication being permitted with the fuel in the float chamber. This feature also prevents waste of fuel when the engine is used as a brake.

In the 26 millimeters model the float chamber is 66 millimeters diameter by 57 millimeters deep and the float is 60 millimeters diameter by 44 millimeters deep, dished at the bottom and flat at the top, and made with a central circumferential joint. The gasoline inlet is at the top of the float chamber directly operated by the float through the means of a taper needle, and a detachable fuel filter is supplied. Small models are air heated and larger models water heated at will.

Micrometer Adjustment on Ideal

In the Ideal carbureter, Fig. 4, the mixing chamber is subjected to a constant depression of approximately 7 inches of water head. As distinct from the modulating pin regulation, the Ideal very nearly approaches the Polyrhoe (in its present form) as a sliding sleeve is provided which rises over a jet orifice varying its width. The Ideal jet is one of its principal features as it comprises a circumferential slit, A, the area through which can be exactly determined by means of a micrometer head at the base of the jet which projects through the bottom of the carbureter. Furthermore, an arrangement is provided by means of a Bowden wire with suitable lever connections to vary the width of the fuel orifice from the driver's seat. The fuel issues from the jet orifice at right angles to the air stream and great care has been taken in filtering the air supply so that the moving member of the carbureter will not become stuck by reason of the presence of foreign matter in the air. The dashpot arrangement is formed by an extension of the floating member operating only on the vertical rise, a loose ring, as shown in the sketch seats on to the by-pass clearance when the floating member rises, but allows this member to drop quickly as soon as the throttle is closed. In this arrangement the fuel orifice is closed right up or nearly so when the air piston comes to rest. The Ideal company also is marketing a number of forms of its micrometer jet, made to attach to the standard forms of carbureters as marketed in Europe, the adapter being fitted into the base of the jet.

Welsh Has Long-Entry, Long-Exit Venturi

The Welsh carbureter has an inlet and outlet of 30 millimeters. The main feature of the instrument is a venturi of 60 millimeters long entry, 80 millimeters long exit, containing a butterfly throttle located 32 millimeters from the outlet where the taper from the venturi has reached its maximum diameter. Considering now the venturi, a 20-degree taper is given to the entry, then there is a parallel portion 10 millimeters long and the diverging taper is 14 degrees between the two sides.

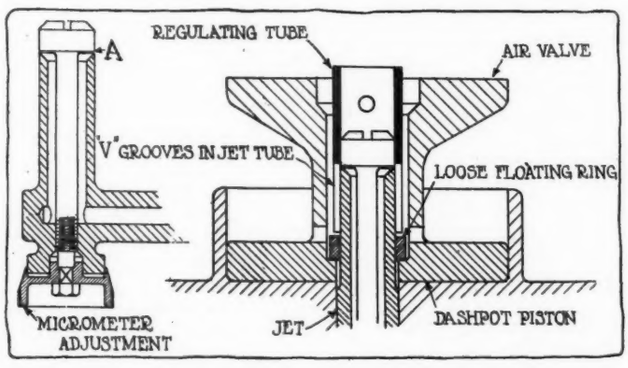


Fig. 4—Section through Ideal jet. The micrometer adjustment is shown in detail at the left

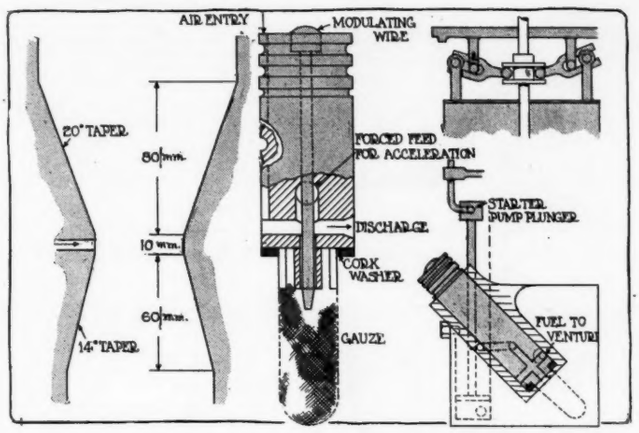


Fig. 5—Details of Welsh. Left—Venturi construction. Center—Modulating wire. Right, top—Toggles used with float. Right, bottom—Fuel pump construction

The gas entry is at right angles through a 1-4-inch hole at the narrowest part of the venturi throat. The jet enters the side of the float chamber at an angle of 45 degrees. The operation and theory of this instrument are somewhat novel, and depend upon the inertia of the gasoline column and the air column in the submerged jet unit. In order to obtain the results required for any particular engine some care must be taken in arranging the length of the gasoline column, and the size of the hole through which the fuel passes. For example, in a 20-horsepower standard engine the gasoline column subjected to inertia is 5.5 millimeters long and passes through a cross hole 1-8 inch in diameter which is countersunk for the depth of 3-16 inch on the discharge side. In a 15.9 horsepower car of another make this arrangement gave too high a fuel consumption, but on increasing the gasoline column to 8 inches length and countersinking the hole 1-16 inch, improved results were obtained. The diameter of the fuel orifice in this model is .067-inch and into this orifice, standard wire gauge obstructing pins are placed, varying from 21 to 24 standard wire gauge in order to regulate the rate of fuel discharge. Placed near the throttle is a small hole supplying fuel for slow running purposes. This hole is 0.1 inch diameter with a modulating wire placed in it.

Another feature of this instrument is the fuel pump for the purpose of acceleration, and this is attached to the throttle arm mechanism. The pump barrel is 5-8 inch diameter, having a pumping piston of the same diameter with a small leakage hole through it in order to give a positive impulse to the fuel at the moment of throttle opening. Delivery from the pump is through a hole of 0.1 inch diameter to the main fuel passage in the venturi of the instrument. A very neat arrangement of cut-off valve is provided to isolate the fuel passage for slow running when the throttle angle has reached 26 degrees of opening. This forms part of the pump mechanism and is an extension of the spindle which overruns a port in the fuel by-pass.

The present form is a very great improvement on the earlier model and is simple in appearance as far as the main operation is concerned, but embodies supplementary features which have not been found necessary in other cases though they may prove extremely effective in working. The float chamber of this instrument is 52 millimeters diameter by 65 millimeters deep and is fitted with a float of 45 millimeters diameter by 37 millimeters deep, and operates through a somewhat unique system of toggles under the float needle.

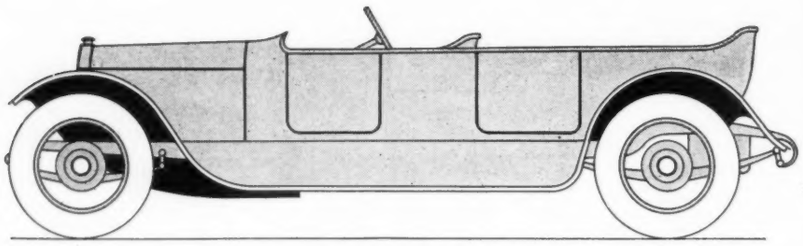


Fig. 1—Excellent body lines of car designed by reader

The Rostrum

Thinks Six Is on the Wane

EDITOR THE AUTOMOBILE:—The editorial in last week's AUTOMOBILE entitled, Reviving the Small Four, is very significant and suggests the trend of development.

The recent return of many makers to the four-cylinder field marks the wane of the popularity of the six. The reasons for the production of six-cylinder machines are becoming less operative and while these reasons were undoubtedly valid when the first sixes were introduced several years ago they no longer have much force.

Six or seven years ago the need for a six was great. Four-cylinder motors of that day lacked balance and were crude in comparison with modern designs, and the slow speeds at which they operated made the lack of continuous torque particularly noticeable. The biggest, most luxurious and highest-priced machines of that day had motors of large dimensions. A motor 6 by 6 inches was not uncommon and these motors were put in cars geared as high as 2 to 1.

This construction had two objectionable features. The running of the motor was so slow that the variation of torque at extremely slow speeds was disagreeably noticeable and it was difficult for one of these cars to pull up a steep hill slowly on high gear. Furthermore due to the large cylinders, the reciprocating weights were great and when the motor was operated at a high speed the vibration was severe.

These objections led to the adoption of the six-cylinder motor, and as proof of this it will be remembered that the first six-cylinder machines were high in price and powerful. The advantage of the six of that day was two fold, the production of power was divided up between six cylinders where four had formerly been used and this meant a smaller piston displacement per cylinder, a lessened bore and stroke, for a given total piston displacement, lighter reciprocating parts and less vibration. Also the poor torque characteristic of the big four was eliminated as the power impulses in the six overlap.

Conditions, however, have changed. The extremely large motors of a few years ago have almost entirely disappeared. The modern motor has a much smaller piston displacement, but it runs at a higher speed and thus develops just as much power. The fact that the cubic capacity necessary to develop a given power has greatly decreased means that the weight of the reciprocating parts has grown less. Thus higher speeds can be attained without objectionable vibration. This increase in speed means that the power impulses of the four, although they can not overlap, come much oftener in the modern large motor than in the motor of several years ago. This gives better pulling power at slow speeds, and amounts almost to the continuous torque of the six.

New York City. R. F. C.

The Advantages of the Two-Cycle Motor

Editor THE AUTOMOBILE:—Your reply to Mr. Rollins concerning the two-cycle engine in your April 23 issue seems to deserve further comment. That the two-cycle has the reputation of being less efficient than the four-cycle is quite true but it is unfair to blame the two-cycle as applied to automobile service for its sins as applied to boats and similar places where it is used at full power and is really less efficient. The usual automobile working condition is at part throttle. It is only in emergencies that an automobile engine is worked at its limit. But the usual boat engine has its throttle thrown open as soon as the dock is cleared and it remains that way till the trip ends. In the automobile service the two-cycle does not waste fuel because it does not admit full charges to the cylinder. There is not sufficient quantity to push over the deflector and out the exhaust port. And the small charge that is introduced is burned under full compression and therefore with a higher efficiency than part charges in a four-cycle where the compressions are lowered by the throttle. So it is easy to get a higher efficiency out of the two-cycle than out of the four-cycle. With full charges it may be wasteful but it certainly is not with part throttle. My motor buggies can easily do 50 miles on a gallon of fuel over a country hilly road. They weigh around 900 pounds, and have solid tires. Many cyclecar makers talk about such distances but the cars do not do them, although weighing less.

It is true as you say, that the work of compression in the crankcase is "a complete loss." Granted, but what about the idle revolution of the four-cycle which is used to do the same service? Is it not a worse loss? What about the bearing friction of the camshaft not used on the two-cycle? Same on the throttling matter. A two-cycle will pull down to a standstill and die in the harness still pulling. It has the four-cycle beaten when it comes to flexibility at the lower speeds. It will not run at such high speeds and give much power because its crankcase makes a poorer pump than the cylinder of the four-cycle and so it does not get in as full charges at high speeds. But usually in daily work high speeds are not needed except on fine roads and there the maximum power is often not needed. So it serves well.

But you are right that it will not idle well. The reason is very simple. It has no load when idling. The four-cycle has the same non-working stroke friction whether it is working or not and as it is throttled down it must take in charges large enough to overcome that friction. So it will fire every one of those charges even at slow speed. But the two-cycle with no idle pistons and no camshaft nor valve friction has really no load and even the smallest charges that can be fired are too large to be needed to overcome the friction and the engine either races or misses. The answer is a brake. Put a load on it and it will fire as steadily and idle as well as a four-cycle. This can be easily proven by cutting out half the cylinders by holding the vibrators down. The re-

maining cylinders, although they do not even have as much friction load as does a four-cycle will fire about as certainly at the same low speeds.

Philadelphia, Pa. CHAS. E. DURYEA.

In the letter Mr. Duryea refers to the question asked was: "What are the chief troubles of the two-cycle motor as regards its use in an automobile?"

An Ideal Six-Cylinder Automobile

Editor THE AUTOMOBILE:—In Fig. 1 is a sketch of what I believe is an ideal six-cylinder car. Most sixes have big engines, long hoods and take up too much room on the chassis. I think a six-cylinder Knight motor 3.875 inch bore 6.5 inch stroke, cylinders cast three in a block to get a more compact and neater looking engine as well as a shorter crankshaft and hood with light weight pistons is best.

The motor should give 75 horsepower on the road and use less oil and gasoline, than some big four-cylinder engines. Cylinders should be offset .75-inch, the springs should be long and 2.5-inches wide and made of vanadium steel. Frame, axles, shafts and gears made of best alloy steel.

The weight of the car should not be over 4,000 pounds. The wheelbase should be 140 inches, tires 36 by 5.5 inch, brakes on all four wheels and 10 inches clearance.

Car should be equipped with a Rushmore starter, tire pump, electric lights, Klaxon horn, and have double floor in tonneau with space between for a spare tire and tools.

Alton, N. H. H. P. TIBBETTS.

Easily-Made Spring Spreader

Editor THE AUTOMOBILE:—A handy device for spreading the leaves of automobile springs for use in garages where it would find considerable use is illustrated in Fig. 2, herewith. It is easily forged out of soft steel and the tips may be slightly case-hardened if desired. The handle may be made of any length to suit the strength of the operator or the stiffness of the spring.

New York, N. Y. W. F. SCHAPHORST.

Using Monkey Wrench as a Vise

Editor THE AUTOMOBILE:—It is often desired to hold a small piece tight, in some way or other, while making repairs in the barn or on the road and you say, "If I only had a vise I could do this all right."

A good way to utilize the jaws of an ordinary monkey wrench is shown in Fig. 3. Adjust the jaws of the wrench until the piece to be held and a short machine bolt can be slipped into the space as shown. Then unscrew the nut until the piece is held firm and with the aid of wrenches the piece can be held so rigidly that you'll wonder why you had never thought of the kink yourself.

Another method that I have seen used is to dispense with the machine bolt by drilling holes in the adjusting nut of the monkey wrench, and by using a nail or other stiff bar for a lever the jaws can be screwed tight.

The one fault with this latter scheme is that the drill for drilling the holes is generally unavailable when the small parts vise is wanted.

Nearly every automobilist carries a monkey wrench, machine bolts and several S-wrenches with him, hence the first method is preferable.

New York, N. Y. W. F. S.

Definition of Circular and Diametral Pitch

Editor THE AUTOMOBILE:—1—What is the meaning of the word pitch in reference to gears? How and where is it measured?

2—Of about what voltage is the current passing through the spark plugs of a motor using an ordinary battery ignition system with five or six dry cells?

3—Why is a coil necessary in a low-tension make-and-break ignition system?

4—Kindly show by diagram the difference between a direct and alternating current generator?

St. Louis, Mo. EDWIN H. KANSTEINER.

—1—There are two kinds of pitch used when speaking of gears, circular and diametral.

The former is the distance on the pitch circle from one tooth to the next. This distance is indicated by the letter D, Fig. 4. The pitch circles of the two meshing gears are also shown. It is seen that these circles are tangent to each other and represent the theoretical line of contact between the two gears considering the gears simply as two rollers.

The latter, or diametral pitch, is the number of teeth per inch of diameter of the pitch circle. This quantity is generally a fraction.

The two quantities, diametral and circular pitch can be formulated and the relation between them is then very easily seen.

$$\text{Diametral pitch} = \frac{\text{Number of teeth}}{\text{Diameter of pitch circle in inches}}$$

$$\text{Circular pitch} = \frac{\text{Diameter of pitch circle}}{\text{Number of teeth}} = \frac{\text{Diameter} \times 3.1416}{\text{Number of teeth}} = \frac{3.1416}{\text{Diametral pitch}}$$

2—The voltage of the high-tension current varies from 6,500 to 10,000 depending on the compression, width of the spark gap and the design of the system.

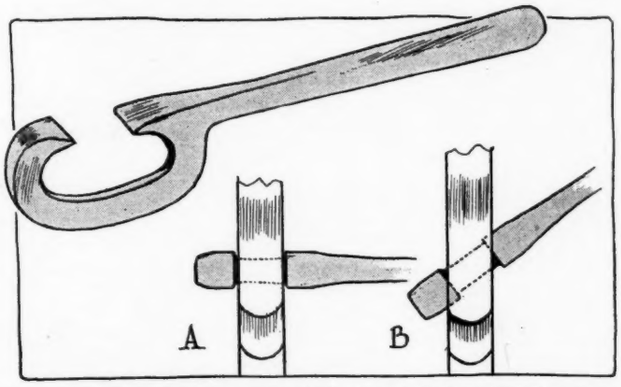


Fig. 2—Easily made spring spreader. A and B show how it is used to force spring leaves apart

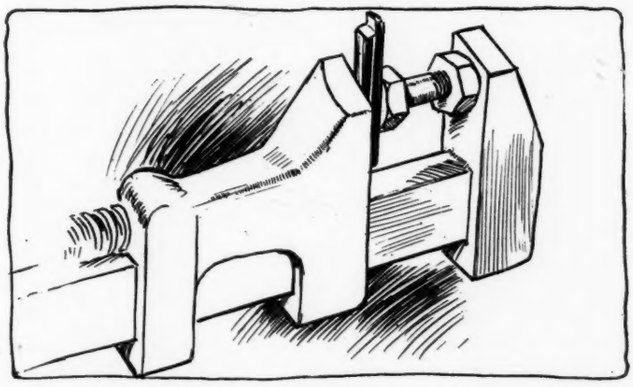


Fig. 3—Method of using monkey wrench as a vise for holding a small piece of work

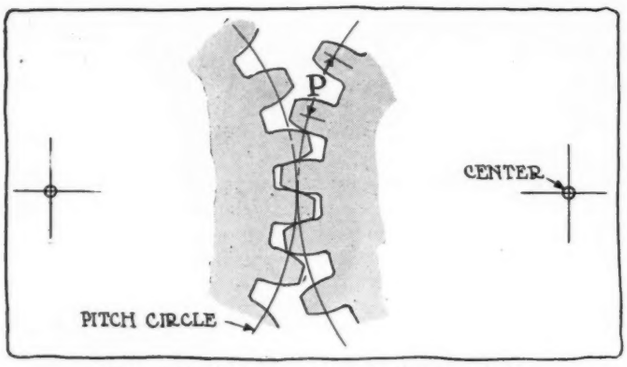


Fig. 4—Method of measuring circular pitch

3—The coil used in the make-and-break system is for the purpose of intensifying the flow of current by utilizing the inductive effect of the coil.

The spark at the breaker points is due entirely to the inductive effect in the circuit and the inductance of the circuit without the coil is so small that a very weak spark would be produced.

Just before the make-and-break points separate full current is flowing through the circuit of which the coil is a part. This means that the coil is surrounded by a magnetic flux produced by the passage of the current through its windings.

Any variation in the strength of this flux will result in an extra flow of current. If the flux increases this extra current will flow in a direction opposite to that of the main current and if the flux decreases, a current in the same direction as the main flow of current will be produced. Thus it is seen when the circuit is broken, the fall of current produces a decreasing flux which causes a large flow of current. In other words the magnetic energy stored in the coil is used to force a current across the points.

4—In simple form, there is no difference between the alternating and direct current machines except in the method of collecting the current. The latter being so constructed that the current waves which are generated in alternating directions are straightened out.

Referring to Fig. 5, an alternating current generator is shown in its simplest form. The field consists of a permanent horseshoe magnet with the north and south poles marked with the letters N and S.

Between these poles the armature consisting of a single turn of wire revolves. The two ends of this wire are connected to rings as shown and brushes bearing against these rings conduct the current to the exterior circuit where it is used for lighting, etc.

The magnetic lines of force passing from the north to the south pole are clearly indicated. As the coil rotates as shown by the arrow a current is generated in it in the direction indicated, because the in and out wires of the coil are cutting the magnetic lines of force at right angles.

When the coil is at 90 degrees to this position no current will be generated and at intermediate positions the amount of voltage generated is proportionate to the angle at which the wires are cutting the lines of force. Therefore as the coil rotates the voltage falls off until the coil is in the position shown by the dotted lines and then as the coil rotates further the positions of the two wires are reversed and the part of the coil that was formerly under the influence of the north pole is now passing under the influence of the south pole and now the flow of current also reverses.

Thus when A passes under the north pole the current is in the direction indicated but when A passes under a south pole the current is in the opposite direction.

This reversal produces a current wave as shown in Fig. 6.

To transform this simple alternating current machine into a direct current generator we must change the direction of every other current wave so that the waves will appear as shown in Fig. 6.

This is done by using one collector ring and splitting it into two parts, Fig. 5, and putting insulation between the ends. The collector ring is now called a commutator.

The action of the new instrument is easily understood with a little study. In the position shown the current flows out through the brush B and when the coil has passed through one-half revolution the direction of flow will have reversed so that the current still flows out through brush B.

Questions Concerning 1914 Hupmobile

Editor THE AUTOMOBILE:—Will you answer the following questions relative to the 1914 Hupmobile?

1—What power is claimed for the motor?

2—Who makes the motor and transmission?

3—How many miles will it run on 1 gallon of gas?

4—Which motor has the most power, 3.75 by 4 or 3.25 by 5.5, 1,200 revolutions per minute?

5—What is the gear ratio on high of the Hupmobile?

McIntire, Iowa. RAYMOND POTTER.

—1—The rating is 32 and the maximum is 33.6 horsepower.

2—Both motor and gearset are assembled in the Hupmobile factory although some of the parts are made on contract by specialists, from Hupmobile designs.

3—Twenty miles.

4—The latter motor will develop more power because its piston displacement is greater, it being 182.5 inches as against 176.7 inches.

According to the modified S. A. E. formula the horsepower of these two motors is 18 and 18.5.

5—On the touring car the gear ratio is 3.6 to 1.

Steering Wheel Ignition Switch for Ford

Editor THE AUTOMOBILE:—Will you please inform me through the Rostrum how I can wire my Ford machine for a push-button switch on the steering wheel to short-circuit the current and stop my engine.

Cadiz, R. I. CHARLES ANDERSON.

A switch for short-circuiting the ignition current can be very simply installed by running an extra wire from the magneto terminal plug on the top of the flywheel case to one terminal of a switch on the steering wheel. The other terminal of the switch can be grounded directly on the wheel. The connections are shown in Fig. 7. An ordinary push-button switch may be used.

Horsepower of Truck Motor

Editor THE AUTOMOBILE:—1—We have a truck with a four-cylinder, water-cooled motor, 4.5 by 6.75 inches. What horsepower should this motor develop?

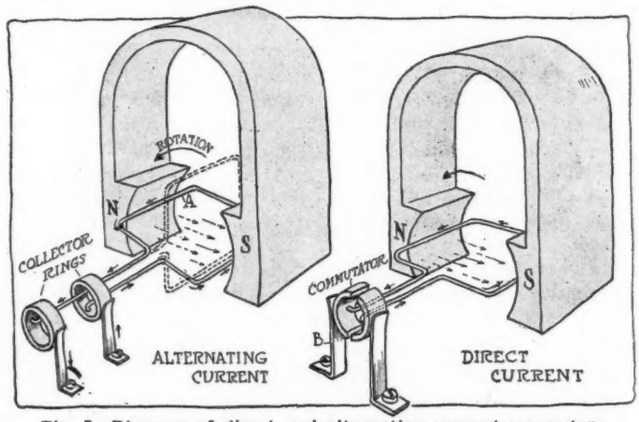


Fig. 5—Diagram of direct and alternating current generators

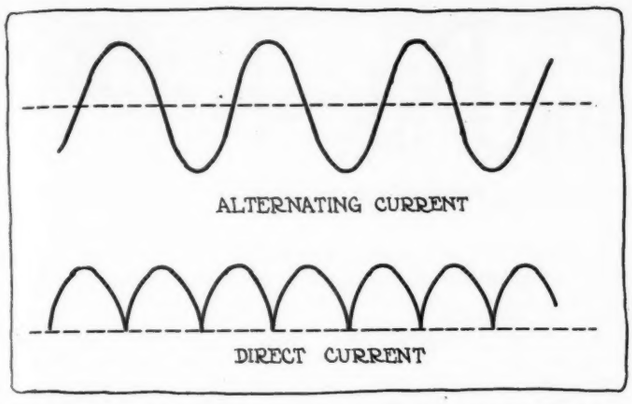


Fig. 6—Shape of voltage and current waves generated by direct and alternating current machines

2—This machine does not seem to have the power it should. Can you suggest anything?

South Fork, Pa. SUBSCRIBER.

—1—Without testing the motor it is impossible to say exactly what horsepower it should give. According to the modified S. A. E. formula which takes into account the stroke and revolutions per minute, as well as the bore and number of cylinders, the rating of this motor is 36.5 at 1,000 revolutions per minute.

In this formula horsepower equals:

$$H.P. = \frac{D^2 N S R}{15{,}000}$$

Where

D = bore in inches.
N = number of cylinders.
S = stroke in inches.
R = revolutions per minute.

2—As you have not given any details as to load, gearing, etc., it is impossible to do more than outline the places where trouble may be found: The gearing of the truck may be too high; the valve timing may be incorrect; or the setting of the magneto late; the cause may be poor compression, the result of leaky valves, pistons, or push rods out of adjustment.

The carbureter may be supplying too rich or lean a mixture, or the motor may overheat due to, running with too late a spark, carbonized cylinders, too rich a mixture, or a defective cooling system.

The clutch may be slipping or the brakes dragging.

Derivation of S. A. E. Horsepower Formula

Editor THE AUTOMOBILE:—1—What is the price of the Delage racer?

2—What type of Bosch magnetos are used on these machines?

3—What is the original of the horsepower formula $\frac{D^2 N}{2.5}$?

What is the maximum voltage of the Bosch high-tension magnetos types ZR4 and ZU4?

Poughkeepsie, N. Y. K. FUKUZAWA.

—1—This is not obtainable.

2—The ZR4 magneto is employed. This model is commonly known as the inclosed type.

3—This formula, known as the S. A. E. is a simplification of the general horsepower formula

$$\text{horsepower} = \frac{\text{PLANE } n}{33{,}000}$$

where P = the average pressure per square inch during the power stroke
L = the length of stroke in feet
A = area of one cylinder in square inches $= \frac{\pi D^2}{4}$
N = the number of revolutions per minute
E = mechanical efficiency of the motor.
n = the number of cylinders

In the S. A. E. formula it is assumed that P = 90 pounds, E = 75 per cent. and that the piston speed is 1,000 feet per minute, the piston speed being equal to NL.

Substituting these quantities in the above formula

$$\text{Horsepower} = \frac{D^2 n}{2.489} = \frac{D^2 n}{2.5}$$

4—The voltage generated by these magnetos varies with the compression, size of spark gap, and the speed at which the magneto is running and therefore it is difficult to give definite figures. Under ordinary conditions of operation the voltage never rises above 12,000.

Magneto Magnets Lift 20 Pounds

Editor THE AUTOMOBILE:—1—Will you please tell me how many pounds the magnets of a Splitdorf model D are supposed to pull?

2—How do you take up the wear in the Studebaker 1912 model steering gear?

Hardwick, Vt. E. H. NELSON.

—1—About 20 pounds.

2—If the wear is in the gears themselves, the play can be removed by tightening the nut at the top of the steering post. Play in the socket joints can be eliminated by screwing up on the socket nuts. Any looseness in the pin joints can only be eliminated by putting in new pins and bushings.

Before adjusting the gear jack up the wheels so that it is free to turn. If this is done there is no danger of adjusting it too tightly.

Please Sign Your Letters

The Editor of the Rostrum is holding several unsigned letters for identification. If the writers of these letters will send in their full names and addresses they will receive replies by return mail.

So many inquiries are received from week to week that it is impossible to answer all of them in the Rostrum but all not published will be answered by mail providing the name and address of the writer is given.

Therefore in order to be sure that you will receive an answer, put your name and address on your letter.

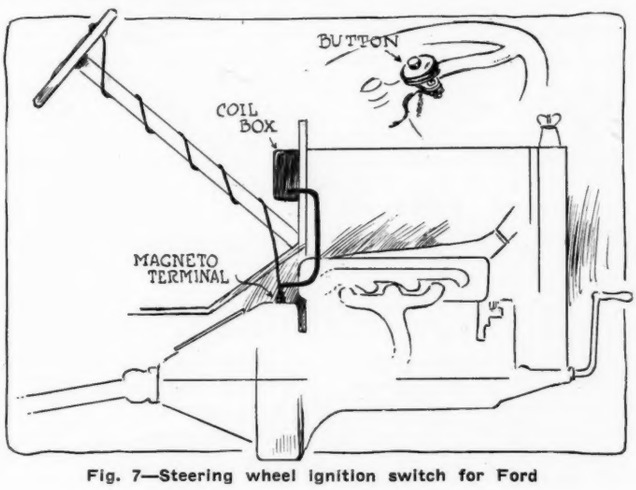


Fig. 7—Steering wheel ignition switch for Ford

The Engineering Digest

Limitations in the Hauling Capacity of 4-Wheel Drive Motor Trucks

A TYPE EVENTUALLY WANTED BUT NOT READY

OWING to the rich market in other directions, little has yet been done to enable contractors to do all the difficult transportation work in their business by means of motor power. For excavating, derricks are more commonly employed than motor trucks and horses more commonly than either. For all heavy freighting over unreliable roads, traction by animals is still supreme, as well as for farm work, although in both these directions the possibility which comes with motor power for speeding-up and continuing working operations during all daylight hours with shifts of workmen, should be very attractive economically. The limitation of these forms of transportation work to the open seasons of the year combines of course with the constructive difficulties to make this branch of motordom unattractive to manufacturers for the present. A feeling that all work for which driving by all four wheels appears to be necessary will eventually be done by electric transmission for the tractor truck and an electric-motor equipment for trailers, may also have something to do with backwardness in these branches. When it is seen, however, how frequently ordinary motor trucks are stalled by snow and have traction troubles on greasy streets and roads, and when it is further considered that the extension of express and other package-delivery service to country districts, which has only been fairly started in this country, will be much facilitated if traction can be obtained under all weather conditions and independently of costly road improvements—which themselves are halted by the uncertainty existing with regard to the best methods for constructing durable roads—the pioneer work done by the French military authorities to develop 4-wheel traction becomes the subject for almost immediate, if not urgent, interest to the American automobile industry.

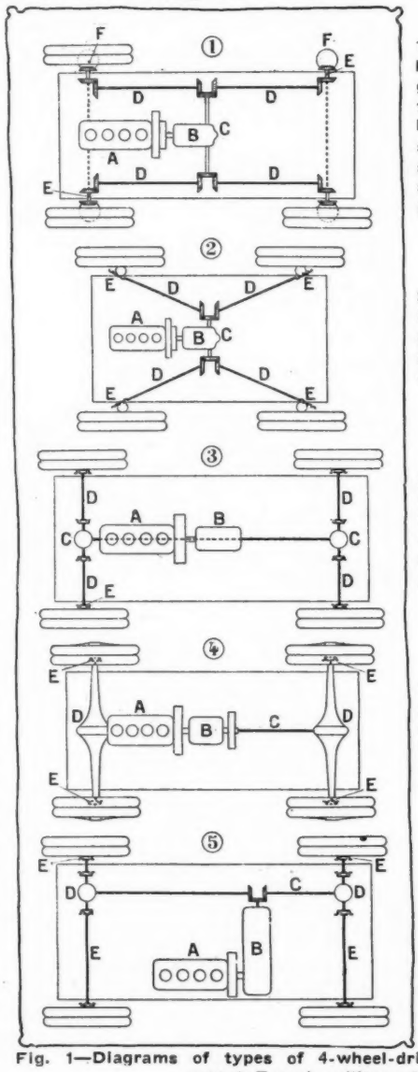
Even in the passenger carrying class of automobiles any radical progress in the simplification and durability of 4-wheel driving would be felt without much delay when once fully established; in the case of motor omnibuses and stages, for example, since the system would give additional speed as well as security against interruptions or irregularities of traffic, would give more freedom to the designer in the arrangement of the load distribution and would save tires under heavy loads by keeping the stresses on rubber compounds within the maximum limit for which such material is adapted. Incidentally the system, once ripe for adoption, might tend to re-install air tires, probably of the twin type now sometimes used for limousines and omnibuses, on vehicles for which they have now been discarded in favor of the solid rubber tires whose cushioning qualities are varied so objectionably by their wear.

The public value of the French military trials of 4-wheel-drive trucks lies partly in their complete divorce from commercial influences and partly in the uncompromising severity of the military requirements. Taken in conjunction with the news report of the trials which appeared recently in this paper, some additional data are of interest, tending to show that something more than the powering of all four wheels must eventually be necessary in order to meet, on a commercial basis, any requirements comparable in severity with those of a military campaign.

The Work Outlined

The vehicles engaged were light tractor-trucks, heavy tractor-trucks and trailer wagons. The light trucks, with a dead weight of not more than 3,500 kilograms, and the heavy trucks, whose dead weight could be 5,500 kilograms, were both to carry a load of at least 2,000 kilograms, and with the aid of trailers should transport, respectively, a payload of 8 and 15 tons more. With these loads they should average a speed of 8 kilometers per hour over any route of medium difficulties, including grades up to 8 per cent., while the maximum speed should never exceed 15 kilometers.

The maximum grades which the vehicles were expected to climb were: 18 per cent. for a loaded truck without trailer, 12 per cent. with maximum trailer load and 15 per cent. for hauling full trailer loads by means of winch or tackle, the tractor-truck being first unhitched. Travel over plowfields



1—Chatillon - Panhard, heavy; A, motor; B, gearbox; C, single central differential; D, lateral transmission shafts; E, auxiliary shafts; F, vertical shafts with bevel gear pinions

2—Chatillon - Panhard, light; E, worm-drive shafts from central differential to wheel gears

3—Blum - Latil, heavy and light; C, differentials on axles; D, wheel shafts with universals; E, reducing-gear pinions

4—Renault, heavy: C, drive-shafts to differentials D in both axles; E, universals at the side of pivot pins of wheels

5—Schneider, heavy: C, lateral driveshafts, each with differentials at both ends; D, differentials on axles; E, wheel shafts with universals

Fig. 1—Diagrams of types of 4-wheel-drive trucks engaged in recent French military trials

and other soft or rough surfaces was also provided in the regulations.

As a matter of fact, rainy weather made the trials even more severe than had been contemplated.

Types of Vehicles

The trailer wagons were of the accepted military pattern, unprovided with any means for assisting in locomotion or receiving traction in any other way than by a simple mechanical pull.

The tractor-trucks were two light and two heavy Chatillon-Panhard trucks, two light and two heavy Blum-Latil trucks, two heavy Renault trucks and two heavy Schneider trucks. The characteristics in the design features relating to the drive-systems of these vehicles are given in the captions and diagrams of Fig. 1. In addition a few other features may be mentioned.

The motor of the heavy Panhard truck had four cylinders of 125 by 150 millimeters bore and stroke, giving 45 horsepowers at 1,000 revolutions, and a low gear giving a vehicle speed of about 2.7 kilometers per hour.

The light Panhard truck had a Knight motor of 100 by 140 bore and stroke and four worm-drive shafts from the central differential to the four driving and steering wheels, each worm driving a pinion mounted at one end of the wheel pivot pin.

The heavy and the light Blum-Latil trucks were alike, excepting the dimensions. The light motor was of 95 by 140 millimeters bore and stroke and the heavy one of 120 by 160. They had five gear speeds and a longitudinal shaft actuating, by a differential at each end, each pair of driving and steering wheels by cardan shafts to the wheel gears.

The Renault motors, 4-cylinder, 130 by 160 bore and stroke, worked by a cardan shaft from the gearbox to each axle, the two axles being alike, and at the side of each pivot pin of the wheels there was provided a universal connecting with the wheel shaft, permitting the wheel to be used for steering as well as for driving.

The Schneider motors were the same as are used for Paris omnibuses, 4-cylinder, 125 by 140, with four gear speeds, all reversible, but these motors in the trucks were under the middle of the chassis at one side, while the gear box extended transversely toward a differential driving the two shafts to the axles where differentials again distributed the action by cardan wheel shafts and reducing-gears upon the wheels.

Avoidable Difficulties

As at previous trials of military trucks, the emergency provisions, in the form of winches and capstans and the training of the crews in using them, were criticised by observers and could easily have been improved. Some capstans were of so small diameter that the cables would not bend to conform with them properly. Their shapes caused the coils of cable or rope to crowd each other, and the devices were geared too high, making the operation difficult. As the means for anchoring the tractor-trucks were also inadequate, it was in many instances only with the greatest efforts that the trailers could be drawn up some short hillside.

Adhesion Failed

In spite of using all four wheels for traction the road adhesion was often insufficient for the tasks imposed. Traction chains were then used, and it took from 3 to 8 minutes to put them on the wheels, different types of chains with different methods for fastening being employed. On plowed ground the expedients were more grotesque, consisting in large blocks of armored wood chained around the wheels (as illustrated with the recent news report on the subject) or in auxiliary wheels with paddle blades secured laterally upon the normal wheels. And yet the hauling of the trailers proved very laborious, especially for the heavy tractors. Grades of 10 per cent., slippery from rain, could as a rule not be negotiated by them, except by subdividing the trailer load and employing the cables and the capstans.

In reality a tractive effort of about 2,900 kilograms is required at the wheel rims to move a total load of 22,500 kilograms (the total of the tractor and the trailer with loads) over a 10 per cent. grade or on soil of equal resistance. And this tractive effort cannot be supplied unless the adhesion to the ground equals 39 per cent. of the weight of the tractor. With solid rubber tires the actual co-efficient of road friction is 60 per cent. on dry macadam, 40 per cent. on slightly muddy macadam and only 6 per cent. on a bituminous road surface covered with greasy slush, though the same material, when dry, gives 80 per cent. It is easily perceived that the hauling of a trailer load becomes rapidly impossible, with such loads as here in question, when the ground is not only slippery but also soft. The performances on plowed ground were in fact in the nature of circus stunts. All the tractors, unhitched from the trailers, could cavort around for a hundred meters or more, with the wheels sinking into the dirt to the hubs, but these maneuvers overworked the crews and mechanics and could not be continued long without danger for the vehicle construction.—From *Omnia*, April 4.

Reasons for the Slow Progress with Hydraulic Transmissions

A SUBSCRIBER requests the compiler of this Digest to state his views with regard to the slight progress made with hydraulic transmissions for automobiles since the experiments made here and in Europe three or four years ago, and also to outline, in so far as he feels able, the conditions necessary for making a success of the hydraulic principle for vehicles, now that it is so successfully applied for the manipulation of turret guns (as well as for steering) in the navies.

Opinions Ventured

For the manipulation of guns and for the steering of ships one of the principal requirements is a maximum of facility for reversals of the power, and the hydraulic principle is supreme at this point, a reversal involving a minimum of mass to be retarded and accelerated and therefore the smoothest, non-vibrating and handy transition from movement in one direction to movement in the opposite direction. Superior to both steam and electric equipment in this respect, the dependability of the hydraulic motor hinges also less upon maintenance; it is robust and remains unharmed even if subjected to violent shock reactions from the operated parts, the guns or the rudders. The interposition of large irreversible machine elements is therefore not necessary for its protection, if its size is commensurate with its work.

In the operation of rolling mills the same qualities should give it a place as an adjunct to the steam engine, which then could be equipped with a flywheel of ordinary size or could be replaced by a Diesel engine.

As quick and easy reversals are not by any means the most important requirement for the transmission of a motor vehicle, it can be recognized at once that there is no compelling argument in the success of hydraulic apparatus in the navies. Also, the hydraulic transmission for a vehicle must be small and reasonably light, while the movements it must transmit must be relatively rapid. Its shafts and their bearings must be of small diameter, must run with a minimum of friction and yet must not leak. To what extent these requirements affect the efficiency, and the amount of care needed for maintaining the efficiency, in a hydraulic transmission of small dimensions appears from the latest reports on the efficiency of the Hele-Shaw hydraulic transmission for motor trucks. With full pump stroke the percentage rises to 90 with a pressure of 60 kilograms per square centimeter, dropping toward 85 at higher pressures. With half stroke

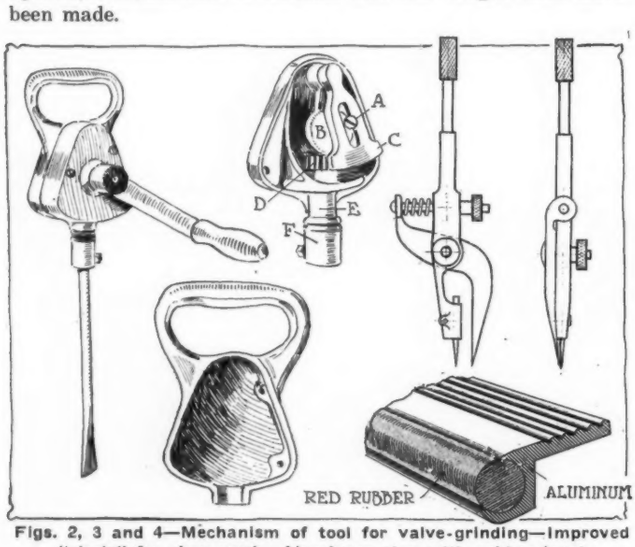
83 per cent. is reached at a pressure of 84 kilograms, dropping to 73 at 140 kilograms pressure, and with one-quarter stroke an efficiency of 73 at 80 kilograms drops to 58 at 140 kilograms. The reduced efficiency coming with reduced stroke represents, at least to a certain extent, an influence of the same factors which make themselves felt when the dimensions of the transmission are reduced. Small sizes give relatively great skin friction for the fluid in the conduits. The play in the bearings cannot with practicable workmanship be made much smaller than in a large transmission, and the friction and wear due to the provisions for securing against leakage along the shafts must therefore be relatively much larger.

If it were not for the fact that wear in the bearings means the need of maintenance care, the relatively low efficiency of the small hydraulic transmission, as compared with a new mechanical gear, would be offset sufficiently by a better sustained efficiency later on, when the mechanical gear gets noisy and wasteful. But the data on maintenance are naturally difficult to obtain, and manufacturers of motor vehicles will remain wary of any hydraulic transmission until such data are very creditably produced with specific reference to the hydraulic construction submitted for consideration.

Most inventors of hydraulic transmissions make them positive in action and also provide for their use for braking purposes. Such design subjects the construction and its joints to great strains occasionally, when it is carelessly undertaken to arrest the momentum of the vehicle by means of the fluid. On the other hand, the designers of hydraulic turbines, which are not positive, have not yet produced practical machines. Dr. Riedler of Berlin, very well known as a leader in applied science and from his elaborate tests of automobiles, suggests that the centrifugal pump, which has an ascending curve of efficiency with increasing speed and is now widely used to throw streams of water from fire engines, presents a better chance as a hydraulic transmission for vehicles than the positive hydraulic pump.

It may be mentioned in conclusion of this fragmentary review of the subject that the advantages of the direct drive have not yet been reproduced in any of the hydraulic transmissions; also that the starting of a motor connected to a hydraulic transmission without an interposed release-clutch naturally is made difficult by the resistances in the fluid channels or bearings or both.

Altogether the gains and the hazards in the adoption of the hydraulic principle, for those forms of vehicle work which can be done very acceptably by other means, will scarcely balance favorably, from a commercial viewpoint, until very complete and unreserved demonstrations of a hydraulic mechanism of suitable size and weight shall have been made.



Figs. 2, 3 and 4—Mechanism of tool for valve-grinding—Improved "circle" for shop work—Aluminum step with rubber inset

Simple Tool to Speed Grinding

MOST devices for facilitating the grinding of valves are designed with a view to the accurate self-centering of the mushroom upon the conical grinder-surface, independently of the diameters of the valve and its stem, and if any attention is paid to the grinding-motion it is often conceived as one of continuous rotation, while in reality it is preferable to reverse the direction of rotation frequently during the operation, to avoid scratches and the accumulation of the grinding-powder in spots. A tool solely intended to produce an alternating rotation by a continuous movement of the operator's hand has now been placed in the market in France, however, and in connection with other suitable devices for centering the valve should expedite grinding jobs considerably.

The improvement is in line with those improvements in inflation pumps in which the main feature is some mechanical movement by which the usual reciprocating pumping movement of the operator is transformed into the more convenient and less fatiguing continuous rotation of a crank.

In the ALP valve-grinder, shown in Fig. 2, an aluminum casing is formed with a bearing for the toolholder F upon the interior end of which a small bevel pinion D is mounted. With this pinion meshes the beveled crown-gear teeth of a sector C which is pivoted near the top of the casing and is formed with a central longitudinal slot. Into this slot projects pin A secured near the edge of the disk B, the shank of which is journaled in the side of the casing and is keyed externally to an operating crank. A screwdriver to engage the customary slot in the valve is secured in F.

It is evident that, when the disk B is turned, the pin A imparts a reciprocating movement to sector C and therefore also to the screwdriver. For completeness, the manufacturer of this tool furnishes also a grinding-paste for use with it.—From *La Vie Automobile*, March 14.

Refinement for Expensive Cars

POSSIBLY the simplest manner for making a step or a running board as rigid as it should be, without having it heavy or encumbering it with truss work, is to make it of aluminum. The edge of an aluminum step can become slippery by use, however, and to obviate this shortcoming of the material and at the same time gain a desirable color effect, the Upton Safety step is made with a red-rubber inset along the edge, as shown in Fig. 3, according to *Automotor Journal* and *Omnia*. It is considered that the red rubber and the bluish-white aluminum, left unpainted, make a pleasing combination of shades, while the rubber inset may be renewed when worn.

Kink for Pattern Shop Workers

IT is said to be difficult to scratch small circles on a piece of wood or metal work with the dividers usually employed for this purpose, the line becoming irregular from vibration. Yet such marking of the work is frequently necessary or desirable in the pattern shop or the experimental department. According to *Werkstattstechnik*, this little trouble can be overcome, as has been found in practice, by making a tool like that shown in Fig. 4. Its characteristic feature is that the adjustable divider arm does not move in a slot of the fixed one, but lies flat against it and is bent around so that the two points come flush. In the use of it, the adjustment giving the size of the circle is first accurately made, whereafter the lower screw, holding the two arms together, is tightened. Circles from .2 millimeter to 16 millimeters in diameter can be accurately marked with this tool, it is stated.

Constant Oiling at Any Grade

White Gravity System of Progressive Feed Provides for Constant Splash by Using Dished Troughs

THE means of allowing for and maintaining efficient lubrication are still occupying much of the attention of engineers and inventors. A solution of the problem, in a manner that is said to keep the motor lubricated under all conditions of grades, has been patented by Ernest M. White, an engineer of Globe, Ariz., and Detroit, Mich.

Before taking up the details of Mr. White's splash system, a word in general may be said as to the so-called splash method of lubrication. This is undoubtedly the most popular way of getting oil to the crank, cam, connecting-rod and piston bearings and to the cylinder walls, as judged both by the number of cars produced and the number of manufacturers using it. According to a recently published table, 81 per cent. of the American models for 1914 use either the simple splash or the combined pressure and splash systems of oiling. Splash oiling means, of course, that some part of the lower ends of the connecting-rods dips into a trough or puddle of oil at each revolution of the crankshaft and throws the oil up on to the parts to be lubricated.

Oiling Constant Under All Conditions

The special merit in the White system of splash lubrication is that the amount of oil splashed up from the splash troughs or puddles is the same, for the same motor speeds, no matter if the motor is inclined, for instance, 25 degrees above or below the horizontal or inclined 30 degrees from the vertical or to both inclinations at the same time. The first case is equivalent to ascending or descending a 46 per cent. grade.

Troughs Dished in Both Directions

The progressive method of lubricating individual troughs has already demonstrated its advantages. In the particular system under consideration an interesting and highly important detail is the dished shape of the troughs in both directions. This is designed so that the quantity of oil contained in the trough when tilted at any angle allows the scoop at the base of the connecting-rod to throw a constant splash.

In some of the older systems of crankcase lubrication, even where baffle walls or separate splash troughs are used, there is a tendency for the oil to flow away from the connecting-rod scoops when the motor is tilted with the result that all of the cylinders will be starved or some starved and the others flooded. When this happens and the motor is kept running for any length of time the results may be disastrous.

Fig. 1 is a longitudinal section of a crankcase designed to this system and shows the level of oil in the splash troughs when the motor is tilted up 25 degrees, which is equivalent to a 46 per cent. grade. Fig. 2 is a transverse section and shows the level in the trough when the motor is tilted to the side through 17 degrees.

The oil is taken from the reservoir by any type of pump, fed through a sight feed if desired, and then delivered either over the timing gears or direct to the oil splash trough A, Fig. 1, for the first cylinder. This preliminary travel of the oil from the reservoir is subject to the ideas of the designer of each different motor. From the splash trough the oil is splashed upon the parts needing it in that locality and the surplus oil is caught by the slanting troughs S on the inner sides of the crankcase and drained into the next splash trough. Here the functions are repeated and in this way an equal amount of oil is kept in all the splash troughs by the progressive draining of the side troughs, no matter whether the motor is of four or six cylinders. The side troughs corresponding to the last cylinder drain back at D into the reservoir R. The adjustment of the amount of oil delivered by the pump is a matter of trial.

History of the Automobile in Chile

SANTIAGO DE CHILE, April 2—Automobiling had its inception in Chile in May, 1902, at which time a single-cylinder, 6-horsepower Darracq, with a four-passenger tonneau was brought into the country by Señor Carlos Puelma Besa on his return from a trip to Europe.

As the first automobile to appear on the streets of Santiago, it attracted public attention both by reason of its novelty and the noise it created. At the same time Señor Cesar Coppeta, one of the foremost bicycle riders in the country, went to Europe to study the automobile industry and to bring back to Chile some of the new machines. On his return Señor Coppeta brought two automobiles. One was a De Dion Bouton with a 3.5-horsepower motor and a four-passenger body which was bought for don Juan A. Chessebrough and the other was a 6-horsepower, single-cylinder De Dion with a four-passenger body.

In 1903 Renault cars began to come into the country. At this time also 8- and 9-horsepower, single-cylinder Darracqs were imported by Besa & Co., while Señor Coppeta imported a 12-horsepower De Dion which was the first car with the motor mounted in front seen in Chile and today this same car is in the possession of Señor Prajoux.

In 1906 the importation of automobiles began on a larger scale and several important runs were held. In 1907 the first electric automobile, a Krieger, was imported and since that date several others have appeared.

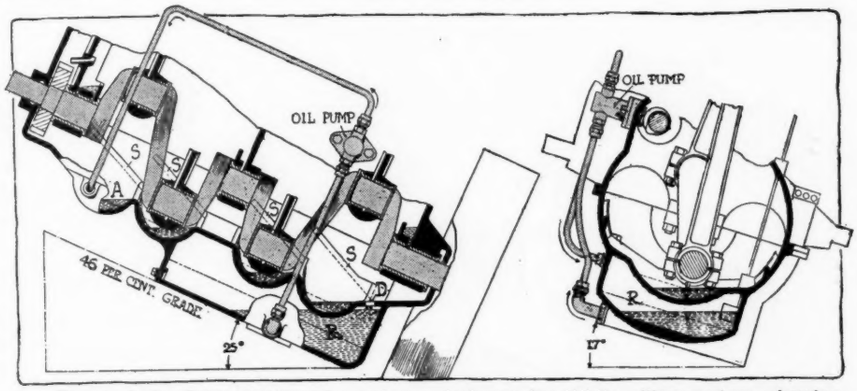


Fig. 1—Left—Cross-section of crankcase designed for White oiling system, showing level of oil in the splash troughs when the motor is tilted at an angle of 25 degrees which is equivalent to a 46 per cent. grade. Fig. 2—Right—Transverse section of the same case, showing the level in the troughs when the motor is tilted to the side through 17 degrees

The AUTOMOBILE

PUBLISHED WEEKLY

Vol. XXX Thursday, May 7, 1914 No. 19

THE CLASS JOURNAL COMPANY
H. M. Swetland, President
W. I. Ralph, Vice-President E. M. Corey, Treasurer
231-241 West 39th Street, New York City

BRANCH OFFICES
Chicago—910 South Michigan Avenue Detroit—505 Free Press Building
Boston—1035 Old South Building Cleveland—516-517 Swetland Building

EDITORIAL
David Beecroft, Directing Editor
Donald McLeod Lay J. Edward Schipper Sydney Oxberry
L. V. Spencer, Special Representative, Detroit

ADVERTISING
F. B. Barnett, Cleveland C. H. Gurnett, Chicago
L. G. Vogel, Detroit F. J. Robinson, Chicago

Cable Address ---------- Autoland, New York
Long Distance Telephone ---------- 2046 Bryant, New York

SUBSCRIPTION RATES
United States and Mexico ---------- One Year, $3.00
Other Countries in Postal Union, including Canada ---------- One Year, 5.00
To Subscribers—Do not send money by ordinary mail. Remit by Draft, Post-Office or Express Money Order, or Register your letter.

Entered at New York, N. Y., as second-class matter.
The Automobile is a consolidation of The Automobile (monthly) and the Motor Review (weekly), May, 1902, Dealer and Repairman (monthly), October, 1903, and the Automobile Magazine (monthly), July, 1907.

The Price Vortex

A CHARACTERISTIC of the automobile market during the last two years has been the establishment of price vortexes which have changed from year to year. These vortexes have been established by two or three large producers bringing out cars of practically the same price, thereby concentrating a comprehensive merchandising policy on this particular price of car, and so quickly popularizing it in the public mind. These price vortexes have been appetizing points in the past to several companies that have endeavored to break into popular favor by having a car of a popular price.

There is such a demand for automobiles selling from $400 to $4,000 and over that it is not necessary to create special price vortexes and imagine that cars listing at such figures will carry the entire industry. Rather, there are places all through the range of prices up to $4,000 and beyond where a legitimate manufacturer can anchor and produce a legitimate car at a legitimate price and have a legitimate profit. Several of our conservative companies are demonstrating this at present.

Changing price vortexes from year to year, one year going higher, the next still higher, then coming back, and the following season coming back still farther, does not create a stabilizing effect on the industry. This changing of price vortexes is worse when the popular-priced cars, or two or three big producers, are setting the figures.

Racing Car Engineering

AS the mechanical details and specifications of the racing cars, which are to represent Europe and America at Indianapolis on May 30, are announced, it is significant to note that the eyes of the entire automobile public—engineers, makers, dealers and owners, are centered upon them.

Every new feature is discussed and argued over by the men who know, or think they know, from one end of the country to the other. Owners are interested, because, aside from their sporting interest in the big 500-mile speed test, they realize that it is to racing car engineering that they must look for improvements and refinements in the automobile of tomorrow.

Straws show which way the wind blows, according to the old saying, but the constructional developments which are being revealed by the new speed creations as they appear are more significant than straws. They shadow forth the car of tomorrow.

The streamline body, one of the developments of the racers' crusade against wind resistance, has been with us for some time. The lighter axles, replacing the cumbersome affairs formerly used, show the effect of the striving for a reduced ratio of sprung weight to unsprung weight, and result in more comfortable riding at high speeds and in decreased tire wear, as the wheels are less likely to slip and pound. The high-speed motor, lighter reciprocating parts, straight-line drive and other features, all have been more or less direct developments of racing car engineering.

Still more interesting are the possibilities for the car of tomorrow. Lighter, but stronger motors, new and more efficient systems of lubrication, larger valves, lighter reciprocating parts, perfected bearings, lower fuel consumption, in a word, higher efficiency and lower cost of operation and maintenance. Perhaps the car of the future will not use a flywheel, but, instead, will have, like one make of racing car to be seen at Indianapolis, a counterbalanced crankshaft in its place. Perhaps new alloys will be used for pistons and connecting-rods. Perhaps the connecting-rods will be hollow for purposes of lubrication. It seems almost certain that it will have a block-cast motor, as many of our present-day machines have adopted this as a standard feature. Better methods of motor, valve and gearbox mounting, better methods of body suspension and many other improvements may safely be expected.

Truly, when it is possible to produce a racing car motor which develops 140 horsepower at 2,400 revolutions per minute, and yet weighs but 650 pounds, it is evident that, for radical departures from iron-bound conventions and the restrictions of tradition which may bring correspondingly radical improvements in automobile construction, we may well look to racing car engineering. For the racing car is subjected in a day to tests which the ordinary automobile is not called upon to undergo in the course of 5 years of town and country operation. And every little weakness, every little imperfection in construction, material, etc., is brought to light by the tremendous and prolonged strain to which they are subjected.

Racing Bares Defects Quickly—Porter

Designer of Mercer Tells S. A. E. That Weaknesses That Might Resist a Long Tour or Even Years of Use Will Come to Surface in a Day of Top Speed—What Lessons Have Resulted

NEW YORK CITY, April 30—At the regular monthly meeting of the Metropolitan Section of the Society of Automobile Engineers at the Automobile Club of America, Racing and Its Effect on Manufacturing, was the topic of discussion. Finley R. Porter, who designed the Mercer cars which have won numerous events during the past few years, read the paper, which was illustrated by lantern slides and moving pictures.

Before the paper was presented the regular monthly business meeting was held. The question of changing the meeting night was brought up and several suggestions were offered to the governing committee. Progress was reported by the research committees. The committee on student membership made a favorable report and the matter is now up to the council.

Announcement of a May festival on the fifteenth at the S. A. E. clubrooms was made, and attention was called to the summer meeting to be held at Cape May, N. J., from June 23 to 26.

Reviews Racing Car Development

Mr. Porter prefaced his remarks with a review of the development of the racing car from the beginning down to the present time. Beginning with the Benz and Daimler machines which took part in the races of 1883, lantern slides showing the leading cars of each succeeding year were thrown on the screen.

The actual results obtained in touring and racing are identical in quality but differ in degree, the results from racing being magnified. Defects that might not show in a touring car in several years of ordinary running will become apparent in a racing car in 1 day.

Mr. Porter stated that in his experience with a T-head motor in Mercer racing machines he had found out many valuable points that could be used to advantage in ordinary pleasure car motor design. For instance, it was found with the high mean effective pressures obtained in racing motors, these amounting to 100 pounds, that there was a tendency for the walls of the cylinders to weave with the result that they would in some cases show signs of fatigue. In a touring car it might be years before trouble from this source might show up. The result of this discovery was that the factor of safety was greatly increased so that the working stress is not over 5,000 pounds per square inch in material that tests 34,000 pounds.

Another lesson that racing has taught is the necessity of straight-line drive and a low center of gravity, the former reducing the wear on the universals and increasing the efficiency of the transmission of the power and the latter making for greater safety.

A Lesson in Weight Distribution

A low ratio of unsprung to sprung weight is another result of racing experience, this feature enabling the car to hold the road better at high speeds, and this is important in a touring car from a standpoint of safety. Furthermore, a low ratio of unsprung weight means a smoother riding car, less tire slippage, and, therefore, increased mileage.

On the Mercer machines the ratio of unsprung to sprung weight on the front wheels is 25 per cent. and on the rear wheels, 35 per cent., and it has been found that with the reduction of these ratios to their present values the amount of tire slippage has been reduced from 5 per cent. to 1 to 1.5 per cent.

Where a shaft-drive construction is used without radius rods the driving stress must be taken by the springs, and as it is usual to shackle the springs at the rear the driving is done through the front. Thus the spring members are in compression and tend to buckle. Heavier spring members must be employed with this construction than are necessary when the shackles are at the front and the fixed ends are at the rear. It has been demonstrated on the recent Mercer racing models that springs of the latter type give better results as they may be made lighter. There is less strain on them due to the fact that the spring members are in tension.

Another important development directly traceable to racing is the streamline body. The form of the hood and body on the racing car is just as important as the design of the motor, and the present wind-cutting designs for racing cars are reflected in the touring cars of today.

Probably the most important result of the influence of the racing car on the pleasure car construction is in the use of fatigue resisting metals, the lessons learned from racing reducing the upkeep and liability to breakdown of touring cars considerably

After Mr. Porter finished the paper several questions were asked him concerning the details of the Mercer machines. In reply to a query as to the weight of the motor per horsepower of the Mercer that won the Grand Prize race he stated that the motor weighed 782 pounds, and that it developed 150 horsepower. Therefore its weight per horsepower is 5.21.

The question of wire wheels was then brought up, and he stated that the saving in weight was small but that there was less mass concentrated at the rim and more at the hub, the result being that the gyroscopic action of the wire construction is considerably less.

Special Research to Be Conducted

As a means of gathering timely information on a number of important topics the Metropolitan Section of the Society of Automobile Engineers has organized a number of special research committees. The duties of these committees will be to investigate the present state of the art and industry with respect to each subject, presenting the information thus gathered in the form of a general report to the Section. In some instances the findings of the research committees will be in the form of descriptive papers covering important aspects of the matters under investigation, and while in the form of technical papers will differ from the previous proceedings of the Section in that they will embody the conclusions of the committees as a whole, instead of giving the opinions of a single individual, as in the ordinary paper read before the society.

In each case the membership of the committees has been selected with special reference to the competence and previous experience of the members, so that the reports may be as conclusive as possible. The committees thus far appointed and the subjects assigned to them are as follows:

GAS-ELECTRIC VEHICLES
Beecroft, David, Chairman.
Kennedy, Wm. P.
Nilson, Lars G.

KEROSENE CARBURETERS
Browne, A. B., Chairman.
Rautenstrauch, W.
Tracy, Joseph.
Whitman, Roger B.

GREASES
Martin, H. M., Chairman.
Bradfield, Geo. K.
Parish, W. F.
Prossen, L. P.

NON-ELECTRIC CONTINUOUS TORQUE TRANSMISSION
Diterich, L. M., Chairman.
Machol, Morris.
Cautley, John R.

ENGINE CHARACTERISTICS
Breese, James L.
Busby, Lloyd G.
Lloyd, Robt. McA.
Porter, Finley R.
Power, W. M.

GOVERNORS
Slade, Arthur J., Chairman.
Fletcher, C. W.
McComb, H. G.

To Fight Standard Oil in Oklahoma

OKLAHOMA CITY, OKLA., May 5—Three hundred independent oil producers of the state of Oklahoma met here this week and perfected an organization to fight the Standard Oil company and its allies in their alleged efforts to control the Oklahoma oil fields. Plans were laid to obtain state and federal aid to protect the independent oil men. Called by the presidents of the two independent producers' associations, the members of both organizations met and organized the Independent Development League.

One Way Traffic for St. Louis Streets

System Devised by Experts to Be Given Trial in Down-Town District, Including Alleys, Beginning May 10

ST. LOUIS, May 5—St. Louis will give the "one way" street system a trial beginning May 10. Assistant Street Commissioner Charles L. Laxton will be in charge of the new regulations which were framed this week by several traffic experts who have made a study of St. Louis' congestion of traffic in the downtown district.

A close observance of conditions showed that Sixth street was one of the busiest downtown lanes, and that the preponderance of traffic on that street moved southward; therefore the street will be made a southbound street. Seventh street will be for northbound vehicles exclusively. These two streets for the present will be the only "one way" lanes; but the alley ways in a district bounded on the north by Washington avenue, on the south by Walnut street, by the Levee on the east, and by Twelfth street on the west—an area of about thirty blocks—will be for traffic in one direction. The north and south alleys will be used for the northern traffic, while in the east and west alleys traffic must move in the westerly direction.

The east side of the Court House at Fourth, Market and Chestnut streets will be widened 15 feet, and this square then will be the downtown parking territory, relieving the congestion which usually prevailed on Fourth street from Washington avenue to Walnut street, a stretch of eight blocks.

The one-way system will be in order only from 7 in the morning until the same hour at night.

At Twelfth street and Locust, the busiest intersecting corner in St. Louis, where, by actual count, 973 automobiles pass each hour, safety lanes have been maintained. Automobiles coming south or north on Twelfth street, the city's widest thoroughfare, use the center of the street, while the vehicles intending to go either east or west on Locust street must hug the curb. A lane is set aside for the pedestrian next to the street car tracks.

Metal signs informing the drivers of the changes in the regulations are being posted throughout the downtown district and are being sent to garages and stables for the guidance of the drivers.

—

Women to Report 8-Foot Leeway Violations

NEW YORK CITY, April 30.—Realizing the need for enforcing the "Eight Foot Leeway Traffic Ordinance," the Safety First Society of Greater New York is conducting an aggressive campaign with the co-operation of Police Commissioner Woods and others. A call for a thousand or more volunteers from the New York City Federation of Women's Clubs has been sent out, these volunteers being asked to act as personal representatives in reporting to the Safety First Society violations of the traffic ordinance.

The Safety First Society has elected O. L. Mills president, with Jefferson DeMont Thompson, Ogden Mills Reid, C. L. Bernheimer and General Howard Carroll, vice-presidents; J. R. Woodruff, treasurer, and F. H. Elliott, general secretary.

—

Society to Determine Best Car Parts

CHICAGO, ILL., May 5—*Special Telegram*—Announcement of the plans of the newly organized American Efficiency Survey of Motor Car Units discloses an elaborate system of testing and recommending to parts buyers the units of car construction which the company finds best adapted for the service. The company was incorporated March 18 at Springfield with Harry Newman, formerly branch manager of the Moon branch in Chicago, as president.

The plans as they are now disclosed consist of the company's making exhaustive tests of every individual unit which enters into the building of a car such as axles, radiators, oils, magnetos, carbureters, tires and so on. The tests are to be conducted at Purdue University by engineers of the Purdue staff and, it is understood, under the supervision of Dean Benjamin, head of the Mechanical Engineering Department of the University. In addition to the engineering laboratory of the university and the master car builders' testing laboratory the American Efficiency Survey has established a third testing laboratory and all three of these, it is understood, are to be employed. Upon the results of tests of all different makes of any one part the company is to solicit membership of the manufacturer producing the best device, and upon the payment of a membership fee its product will be recommended in the advertising campaign. In addition, the company will maintain a bureau of technical information to give free service to inquirers upon any point connected with motor car engineering, the idea being, it is assumed, to recommend the product of the membership when the first series of tests have been completed.

—

Crescent Car, $985, Being Tested

ST. LOUIS, MO., May 5—Another St. Louis-made automobile made its appearance in the market this week when the Crescent Motor Car Co. completed its experimental automobile which now is undergoing the severest tests as a demonstrator.

The car is of the streamline type and has no dash lamps. The place of these is taken by small lamps in the headlights. The motor of the automobile is of four cylinders, 3 3-4 by 4 1-2 inches. They are cast in pairs. It has multiple-disk clutch running in oil, a 112-inch wheel-base, right drive and center control. The Deaco starter and generator are used and the weight is announced at 2,100 pounds. This type will be known as the Superior Light Four.

The price, f. o. b. St. Louis, will be $985.

—

Buick and Others Sell Out in Milwaukee

MILWAUKEE, WIS., May 5—The announcement just made in the public press by the Milwaukee branch of the Buick Motor Co., that the Wisconsin allotment of Buick cars for 1914 is entirely sold out has acted as a stimulant to sales in Milwaukee and vicinity, inasmuch as the condition is not unusual among large distributors in this district. Since Buick made its announcement, other dealers have been looking over their books and find that their allotments are nearly closed out. This condition has never been known so early in the season as May 1 and indicates that while general conditions of business may be a bit awry, motor cars are moving as rapidly or more so than in former years. Statements by a large number of dealers are to the effect that more cash business is being done this year than in former years.

—

Titan Storage Battery Co. Locates in Newark

NEWARK, N. J., May 2—The Baltimore Electric Storage Battery Co., Baltimore, Md., has changed its name and also its location. The Titan Storage Battery Co., as it will henceforth be known, has selected Newark, N. J., as its new location, at Chapel street and Lister avenue. The personnel of the company remains intact, no changes taking place. The following are the officers: H. M. Keith, president; D. C. Spruance, vice-president; E. S. Hyde, treasurer, and H. M. Hanson, secretary. The board of directors consists of the

New Ford building for New England trade

above officers and two other members, J. G. Gray and M. C. Keith. The general manager is Dr. W. E. Winship and A. H. Mustard is sales manager and Eugene Handler, superintendent. The control continues in the hands of M. G. Keith, vice-president of the United Fruit Co. and president of the International Railways of Central America.

Steele Truck Out; Has Large Wheels

BOSTON, MASS., May 5—The first model of the new Steele truck being built by W. H. Steele, at Worcester, Mass., was finished last week and it is now on the streets being given a test. The wheels of the new vehicle are larger than the ordinary truck to give greater pulling power. It has a speed control devised by its maker and there are other features about it that are original. This truck has been sold already. Mr. Steele has his plant at 100 Beacon street now. He formerly built trucks from some of the parts of the Morgan truck whose interests he bought out in 1912.

BOSTON, MASS., May 5—The Bay State is the name of a new gasoline truck that is being built at Cambridge, Mass., by the Britton-Stevens Corp. formed recently. The plans have been made by W. C. Guilder, formerly identified with the Mack Motor Truck Co., at Allentown, Pa., who has been made vice-president and general manager of the Britton-Stevens Co.

Ford to Buy Site for Electric Car Plant

DETROIT, MICH., May 6—*Special Telegram*—The Ford Motor Co. is negotiating for a factory site for the building of a plant in which to manufacture the low-priced electric that is to be marketed, perhaps within a year. Options have been secured upon the property owned by the Chevrolet Motor Co. across Woodward avenue from the Ford plant and also on a tract on the same side of the street and north of the plant. It is probable that the latter location will be selected but the deal is not to be closed for a week hence.

James Couzens, vice-president and treasurer of the Ford company, stated to-day that negotiations have been under way for some time but that nothing definite would be done for about a week.

Argue for Anti-Price-Cutting Bill

NEW YORK CITY, May 6—A meeting consisting of 150 jobbers, dealers and manufacturers was held last week in this city before the Committee on Commercial Law of the Merchants' Assn. to argue for and against the Stevens bill, H. R. 13,305, which would remove price-fixing from the ban of the courts and make it legal. The bill is designed to make price-fixing permissible, but not compulsory. The general trend of the arguments in favor of the measure were that price-cutting permits the big trading corporations to cut the price and force the little dealers out of business and thereby make the big dealer a monopolist in the field. The opponents stated that it would not help the little man and would damage the big man. The defenders of the measure declared that it was an anti-monopoly measure and the opponents called it a monopoly bill.

New Home for Ford N. E. Branch

BOSTON, MASS., May 1—The New England branch of the Ford Motor Car company celebrated 8 1-2 years of existence by moving into its handsome new 5-story assembling plant just across the river in Cambridge at the junction of the Charles River Parkway and Boylston street. The building vacated by the company is practically new for it has been used but two years and it was built to order for the Ford branch here. Manager Charles E. Fay celebrated the opening with a luncheon at the Hotel Thorndike. The branch does a business of $6,000,000 a year, and it serves all the New England States except Connecticut.

The new building has a total floor space of 202,000 square feet.

E. P. Batzell Passes Away

DETROIT, MICH., May 5—*Special Telegram*—E. P. Batzell, an engineer of the Hudson Motor Car Co., died last night. Mr. Batzell was a consulting engineer and prominent in the Society of Automobile Engineers. He was also a contributor to THE AUTOMOBILE. The funeral will be held in Buffalo on May 7.

To Re-Make Old Tire Casings

New Company Established to Re-Construct Any Make Tires by Secret Process

NEW YORK CITY, May 1—Under the name of the Motor Tire Re-Construction Co., a concern has been incorporated in New Jersey for $250,000 and started in this city to carry on a line of work which has been a marked success in Great Britain. This company is engaged in the remaking of worn-out casings or, in other words, of going beyond the mere re-treading of a shoe in giving it the appearance and for all practical purposes the same construction as a new tire.

It is generally admitted by both tire manufacturers and motorists of experience that tire re-treading in the United States is a failure in a large majority of cases. That is, the additional mileage obtained from the tire does not warrant the amount of money expended in the re-treading. On the other hand in Europe re-treading has been successfully carried on for the past 5 or 6 years, and has proved to be a success. The particular process which is used by the Motor Tire Re-Construction Co. is now in successful operation in Great Britain, all of the territory in that country being now apportioned to agents.

The process of re-treading which is practically the same as that used in the manufacture of Mogul tires is a secret one invented by I. S. MaGiehan, the leading spirit of the Mogul Tire Co. In general it consists of removing all the old tire down past the breaker strip to the old fabric carcass. The tire is then covered with not only a new tread but a new built-up band tapering in thickness from the tread down to the bead and giving the tire a section like that shown in the accompanying illustration. The band or ring which is put over the old carcass has six or seven layers of a fabric made from the strongest fish line. This forms the joining material for a preparation consisting of Pasava gum and rubber. The whole mass is vulcanized together under 80 tons hydraulic pressure.

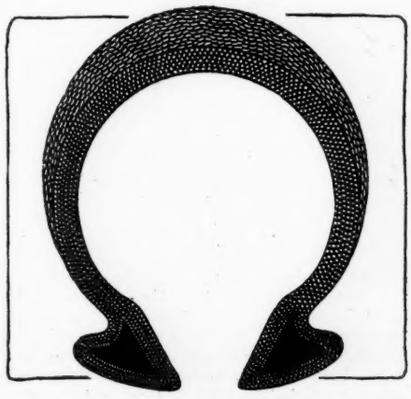
Process Is Kept Secret

The secret of the process lies in the successful combination of the Pasava gum and the rubber. The difficulty in combining these two products is that the Pasava gum, which is extracted by squeezing the Pasava nut, is a hydrocarbon which is a strong rubber solvent. Mr. MaGiehan claims that it has been hitherto impossible to combine these two products in a stable compound.

Before the heavy ring is applied to the tire carcass, the latter is thoroughly filled by using a soft, uncured elastic band of the Pasava gum and rubber, which is applied to the carcass and when vulcanized fills all the irregularities and presents a firm binding surface to the heavy band when the latter is applied.

It takes 25 minutes to rebuild one tire and eight can be done at a time. The company intends to establish an agency in each city and town, supplying the agent with a full equipment of machinery consisting of a steam vulcanizer, a set of separable cores and also all the hand tools necessary to do the work. A contract with an agent includes the license to use the process within his district.

The company claims that a tire of good manufacture can be rebuilt on an average of four times and that each re-building should give an additional 5,000 miles.



Tire reconstructed by MaGiehan process

Motometer Not an Invention, Is Stewart-Warner Answer

Denial of Originality of Discovery in Radiator Thermometer Case—New Device To Be Different in Design

NEW YORK CITY, May 4—The Stewart-Warner Speedometer Corp. of New York has filed its answer in the suit brought against it two weeks ago by Harrison H. Boyce and the Motometer Co., Inc., and makes a sweeping denial of all charges. The defendant acknowledges its connection with the Stewart-Warner Speedometer Corp., incorporated under the laws of Virginia, but prays that the complainants be made to prove statements regarding the organization of the Motometer Co., Inc.

The Stewart-Warner corporation denies that it has infringed or conspired to infringe any rights of the complainants. It also claims that the exclusive right to the alleged improvements on which the Boyce patent No. 1,090,776 was granted are of no advantage or profit to the plaintiffs or either of them, and denies any quality of invention in the same. Further answering, the defendant claims that patent No. 1,090,776 has always been void because all points covered in its claims were known and practiced long prior to the alleged invention, stating: "The matters set forth in the claims of said letters patent involve no exercise of the alleged inventor's powers of invention or original discovery, but could have been produced by the employment of mere mechanical skill and imitation, and that each and all of said claims are void for want of invention."

The defendant states that the device which it intends to put on the market is not similar in appearance to the complainants' device, so as to be substituted by unscrupulous dealers. It also declares that neither by itself nor in conjunction with the Virginia corporation did it circulate advertising matter containing untrue statements regarding the plaintiffs' apparatus or business or false representations. regarding the same.

Claims Superiority for New Device

Regarding the device which the Stewart-Warner company is preparing to put on the market, it is claimed that it is "a device adapted and intended for the purpose of indicating truly the temperature of the cooling water in the radiator of an automobile, which said device is, and is designed to be when marketed, of the highest character and workmanship and of superior efficiency for the purpose to any device heretofore on the market, and adapted and calculated to give the highest satisfaction to the purchasers and users thereof." The defendant also claims that putting this device on the market will have a beneficial effect in stimulating public demand for similar instruments of all makes.

One of the claims on which the defendant bases the assertion that the Boyce patent No. 1,090,776 is invalid is the statement that Joseph Tracey, of Rutherford, N. J., and others whom the defendant intends to name in an amendment to its answer, knew and used the ideas incorporated in its claim prior to the alleged date of invention. The defendant also states that all the features of invention mentioned in this patent are covered by the following United States patents numbers:

80,700	286,581	523,636	879,474	978,983
106,142	294,732	645,736	899,313	999,567
120,464	364,940	654,067	904,163	1,018,306
173,128	428,482	678,131	912,433	1,035,952
176,778	492,236	710,385	926,993	
199,442	517,388	752,452	928,933	
230,282	518,442	829,590	957,665	
277,446	533,365	853,309	977,419	

A motion by the Motometer Co. for a preliminary injunction was argued last week in the United States District Court in New York City. The court is expected to hand down its decision this week.

Injunction Against Houk Denied

BUFFALO, N. Y., May 5—The preliminary skirmish in the wire wheel patent litigation brought in the United States Court in Buffalo about 4 months ago by the Standard Roller Bearing Co., Philadelphia, Pa., against the Houk Mfg. Co., Buffalo, N. Y., was won yesterday by the Houk interests when Judge Hazel denied the Standard company's request for a preliminary injunction. The motion was argued April 17.

The dispute dates back to a contractual agreement between Houk and the Standard company whereby the former was to manufacture wire wheels under the Rudge-Whitworth triple spoke patent and the George W. Houk Co. was to act as the distributor or selling agent. The details of the breach of relations are not essential, but later Houk formed the Houk Mfg. Co. which engaged in the manufacture of wire wheels in Buffalo. The George W. Houk Co. continued to act in a sales capacity.

The Standard Roller Bearing Co., claiming Houk had no right to make wheels and was not a licensee, instituted suit, naming the Houk Mfg. Co. as the defendant. When the motion for a preliimnary injunction was argued April 17 the defendant contended that it manufactures only and that the George W. Houk Co., for which it manufactures, holds a proper license.

This feature of the situation was given due consideration by the court and Judge Hazel, holding that the Houk selling company has a proper license under the Ridge-Whitworth triple-spoke patent, declined to enjoin the Houk Mfg. Co. The case now should proceed to trial some time next fall if no other developments intervene.

Contests Cadillac's Use of Two-Speed Axle

CHICAGO, ILL., May 5—To restrain what is alleged to be an infringement of patents covering the particular type of two-speed rear axle which has been made such a prominent feature of Cadillac cars, the Direct Drive Axle Co., of this city, has entered a bill in the United States District Court against the Cadillac Automobile Co. of Illinois, Chicago distributer of Cadillac cars. The action has been aimed at the Chicago Cadillac branch in order that it may be fought out on the home ground of the suing company. As yet, no definite steps have been taken in the case, nor will any be taken until the Cadillac company files a formal answer to the bill of complaint.

The axle about which the action centers, as already is fairly well known, is of the type in which there are two sets of bevel driving gears, one set giving a considerably higher final gear ratio than the other. Either set of gears may be used at the option of the driver of the car, a small lever being provided for making the desired change.

Argue Appeal in Klaxon Patent Case

NEW YORK, May 5—The appeal in the case of the Lovell-McConnell Mfg. Co., maker of the Klaxon horn, against the Automobile Supply Mfg. Co., maker of the Newtone horn, was argued today in the United States Circuit Court of Appeals. According to the procedure in this court the decision may be handed down in about a month. The case was tried in the United States District Court in Brooklyn, where the Klaxon company secured a sweeping victory with its patents, Nos. 923,048, 923,049 and 923,122.

Truck Insurance Higher—Other Rates Lower

NEW YORK CITY, May 1—A readjustment of automobile liability rates has been made, effective on and after this date. This change, as applied to the greater New York territory, does not materially affect the rates for private passenger cars except in that new rates have been created for public liability only at $2.50 less than the old rates, which continue for public and employers' liability. That is, if a man drives his own car he pays $2.50 less than if he has a chauffeur. New rates have also been created covering public, employers and compensation under the workmen's compensation laws of any state at $7.50 over the old rates.

The principal change in the new schedule is in the rates for commercial automobiles, which have been advanced from 20 to 40 per cent. over the old rates, with a corresponding increase in the cost for property damage coverage. The following table affords a comparison of the old and new rates for commercial cars under the various classifications:

	Liability		Property damage	
	Old	New	Old	New
Class 1	$175	$250	$70	$100
Class 2	150	200	60	80
Class 3	125	150	50	60
Class 4	90	125	36	50
Class 5	70	100	28	40

The new rates on these cars for liability are for public liability only, there being an additional charge of $3.50 and $5 for the employers' liability. The classifications above referred to in the table are as follows:

Class 1—Baggage transfer, electric light companies, express companies, mail wagons, newspaper delivery, police patrol, street railway, telephone and telegraph companies.

Class 2—Boiler dealers or makers, invalid carriages, iron and steel, junk dealers, machinery dealers, railway iron.

Class 3—Bottlers, brewers, department stores, dry goods stores, furniture moving, liquor dealers, news companies, oil distributing companies, parcel delivery, parcel post, safe movers and manufacturers, truckmen, warehouse and storage automobiles.

Class 4—Barrel and box manufacturers or dealers, building material merchants, carpenters, cleaners and dyers, coal dealers, contractors, feed and grain dealers, furniture dealers, gas and water mains, ice cream dealers, ice dealers, laundries, lumber dealers, masons' materials, mineral water dealers, piano movers and dealers.

Class 5—Vacuum cleaning automobiles, all commercial automobiles not otherwise classified.

—

Churchill Now Winton General Manager

CLEVELAND, O., May 5—President Alexander Winton announces the appointment of Chas. W. Churchill as general manager of the Winton Motor Car Co. This is a newly created office. Mr. Churchill has been with the Winton company for 10 years. Starting as salesman at the Cleveland branch, he became successively assistant manager of that branch, manager of the New York branch, and general sales manager, occupying the latter position 5 years.

—

Lyons-Atlas Elected Member of C. of C.

NEW YORK CITY, May 6—At the meeting of the officers and directors of the National Automobile Chamber of Commerce held at the headquarters, 7 East Forty-second street this afternoon, the Lyons-Atlas Co., of Indianapolis, Ind., was elected to membership in the Chamber. Reports from several committees were read, including an interesting report from the Patents Committee. The report on Good Roads by R. D. Chapin showed that there is a much stronger feeling in both the eastern and western states toward building roads of cement, brick or other material of low up-keep.

During National Automobile Touring Week, June 27 to July 4, the Chamber of Commerce will promote one of at least three 2-day tours to be held this year in co-operation with the A. A. A. Another of these tours will be held during this summer and the third in the fall. It is possible that medals or certificates will be awarded to winners.

The show committee reported that a sufficient number of members did not signify their intention of exhibiting at the Panama Pacific Exposition in 1915 to warrant the national body taking it up, though individual members may exhibit if they see fit.

The annual meeting of the Chamber will be held June 4 at the headquarters at Forty-second street. Those who were present at today's meeting were: Col. Charles Clifton, L. H. Kittredge, Wm. E. Metzger, C. C. Hanch, A. L. Pope, H. H. Rice, John N. Willys, Wilfred C. Leland, Alvin Macauley, R. D. Chapin, Windsor T. White and Alfred Reeves, general manager.

—

Col. Clifton Gives Dinner to C. of C.

NEW YORK CITY, May 6—As a personal recognition of the co-operation of his associates in the organization and launching of the National Automobile Chamber of Commerce, President Charles Clifton gave a dinner to the officers and directors of that organization at the Hotel Biltmore, last evening.

Colonel Clifton's leadership in organization work, his well known spirit of co-operation and his admiration for men who accomplish things were back of the dinner, although he says the idea was brought forcibly to his mind by a few lines of verse by Berton Braley, which warned, even when business competition was the keenest, against forgetting the real man and the true friend.

Aside from the optimistic spirit which prevailed as a result of trade reports received throughout the country, there were some delightful reminiscences of the early days of motor car manufacture, practically every one of those in attendance having been in at the birth of the motor car in America.

The graphic descriptions of tours and races won and the obstacles overcome, and the tales of the beginning of many of the big motor car companies, made the affair so interesting that it is certain to become an annual fixture.

The officers and directors of the Association who were Colonel Clifton's guests, included Colonel George Pope, Wilfred C. Leland, S. T. Davis, Jr., H. H. Rice, Windsor T. White, R. D. Chapin, C. C. Hanch, Alvin Macauley, Wm. E. Metzger, Albert L. Pope, L. H. Kittredge, S. D. Waldon and Alfred Reeves.

Garage, a Potential Nuisance, Can Be Excluded

—

A Municipality's Right to Forbid Locations in Restricted Areas Upheld by Illinois Supreme Court

CHICAGO, ILL., May 4—The right of a municipality to forbid the erection of a garage within restricted areas—which right was recently upheld by the New York courts—has been sustained by the Supreme Court of Illinois. The case in question was brought by Henry Busching against the building commissioner and the city plan examiner of Chicago, in which Busching asked a writ of mandamus compelling them to issue a permit for the erection of a garage at 871-877 Chestnut place.

An ordinance forbids the erection of garages and other specified buildings within 200 feet of churches and certain other institutions and buildings, and on this ground the permit had been refused, the site being within 200 feet of the Fourth Presbyterian Church. Busching contended that the city has no power to legislate on this subject and thus deprive citizens of their rights, and that even if the city has the right the ordinance is unreasonable.

In answer the court stated in its opinion, which was written by Chief Justice Cooke, that this authority is specifically delegated to the municipality and that the law is not unreasonable. A garage is not a nuisance of itself, the court stated, but might be a nuisance if within 200 feet of a church.

—

Strict Laws for Bay State Garages

BOSTON, May 2—Chief J. H. Whitney of the State police has just issued the new laws and regulations relative to garages. As a result there will be a lot of changes necessary within the next few months on the part of garage and repair shop owners throughout Massachusetts. Part of the regulations go into effect May 15 and others do not take effect until October 1 next.

As there is a penalty of not more than $100 or one month imprisonment, or both, for violation of the laws and regulations, and as the permit for a garage may be revoked for cause, the law has real teeth in it. In the new law relative to garages, if one seeks to get a permit now he must advertise the fact and send special delivery notices to owners of abutting property. Then there must be a public hearing before some municipal body and the applicant pays all the costs.

Some of the sections in the regulations have been in force for years relative to the keeping of garages, but others are new this year. No garage may be maintained that is within 50 feet of the nearest wall of a hotel more than two stories, a hospital, school, theatre or other public place of amusement. Where such garages have been maintained in the past the regulations do not apply unless the conditions, in the opinion of Chief Whitney, are hazardous.

The garages are divided into five classes. First class garages may be erected and maintained within the fire limits of any city or town, but all the other four classes must be outside the fire limits. The second class garages must not be more than one story, unless by special permit.

Third class structures must be not less than 20 feet away from any building three stories or less, and at least 50 feet from any building that is taller than three stories, and the capacity is limited to four motor cars. The fourth class garages have the same limitations of distance and are limited to one car. The fifth class must be not less than 100 feet from any other building not owned or controlled by the garage owner, and the capacity is limited to two cars. Garages of the third and fourth class may be located nearer than the specified distances if the other buildings have fireproof walls without openings.

There are also rules for the operation and maintenance of garages, and the handling of fluids. Some of these are new, others have been in force some years. The whole plan of the regulations is designed to minimize fire risks.

—

ST. LOUIS, MO., May 5—Figures from the state registration bureau show that during the months from January to April 1 8,330 were licensed from St. Louis. Of these cars 7,569 are gasoline or steamers, 439 are electrics and the balance, 332, are commercial vehicles.

Motor Exports Doubling Shipments of Other Vehicles

Combined Value of Locomotives, Street Cars, Wagons, Etc., $15,000,000—Motor Conveyance Shipments, $23,337,332

NEW YORK, May 1—Exports of American automobiles, motor trucks and motorcycles now almost double in value the exports of all other kinds of vehicles combined, including railroad and street cars, as shown by a comparison of government figures made by the National Automobile Chamber of Commerce. For the 8 months ending with February, 1914, the total value of motor vehicles, automobile engines, tires and parts, and motorcycles was $23,337,332. During the same period the exports of all other vehicles and parts amounted to $12,529,844, exclusive of steam locomotives. Adding locomotives brings the total roughly to $15,000,000. This includes railroad and street car rolling stock, wagons, carriages, aeroplanes, bicycles and tricycles.

Our exports of motor vehicles have increased steadily while imports are decreasing rapidly. For the eight months' periods ending with February, 1912, 1913 and 1914, we exported respectively 12,347 motor vehicles worth $12,000,000, 14,488 worth $14,852,000 and 16,883 worth $15,716,000. During the same periods we imported 717 motor vehicles valued at $1,572,000, 569 valued at $1,329,000 and 230 worth $529,000.

Government reports show that exports of automobiles from the port of New York during March, 1914, were 38 per cent. ahead of those of February, 2,479 cars being shipped as compared with 1,797 in February and 1,841 in January. The total value of vehicles and parts shipped in March, exclusive of engines and tires, was $2,204,388.

—

Chalmers Ships 1,568 Cars in April

NEW YORK CITY, May 4—The month of April marked a new record for the Chalmers Motor Co., Detroit. There were 1,568 cars shipped in that month, which was the largest in the history of the company. On the final day 101 cars were shipped. The value of the month's turnout was $3,000,000.

—

N. S. Wales Imports Are $2,789,159

NEW YORK CITY, May 4—Imports in 1913 into New South Wales totaled $2,789,159, of which $2,205,317 represented chasses, $376,238 bodies, and $207,604 motorcycles. In 1912 the total imports were valued at $2,873,690, of which $2,315,914 represented chasses, $358,013 bodies, and $205,769 motorcycles. The fact that the number of bodies imported has increased so materially is due to the local demand for low-priced American cars, which are sold for delivery there complete and ready for use. The following shows the imports of chassis by countries of origin in 1912 and 1913:

Countries	1912	1913
United States	$552,674	$646,038
United Kingdom	796,694	768,415
Canada	161,962	214,443
Austria	12,974	1,654
Belgium	128,194	47,803
France	302,152	233,694
Germany	132,708	144,267
Italy	208,807	139,566
Netherlands	891	2,142
Sweden	23,383	3,451
Switzerland	5,475	3,844
Total	$2,315,914	$2,205,317

—

Agree on Kelly-Springfield Refinancing

NEW YORK CITY, May 4—The refinancing plan of the Kelly-Springfield Tire Co. was adopted today with a total of 44,000 shares of stock out of 51,000 in its favor. The opposition, headed by A. M. Polack, a curb broker, received but 2 per cent., or about 1,000 shares. This plan calls for an increase of the capital stock from $5,149,500 to $10,299,000, divided into 6 per cent. cumulative preferred stock, $4,239,200; 7 per cent. cumulative second preferred stock, $1,029,900; and common stock, amounting to $5,029,900.

The former capital of $5,149,500 consisted of $2,850,500 in 4 per cent. income debenture bonds due April 1, 1915; $1,149,500, 6 per cent. cumulative preferred stock upon which dividend arrearages amount to 78 1-2 per cent., and $4,000,000 common stock. The 78 1-2 per cent. of back dividends on the stock are to be funded into new 7 per cent. second preferred shares.

The old directors were re-elected, consisting of Van A. Cartmell, president of the company; F. A. Seaman, Austin Poole, Stephen Peabody, Gustave Maas, A. J. Scheuer and J. Oppenheim.

—

Studebaker Report Shows Decrease

NEW YORK CITY, May 2.—The Studebaker Corp. of America, incorporated under the laws of New Jersey, has filed with the Massachusetts secretary of state a statement of its financial condition, compared as follows:

	1914	1913
Assets:		
Real estate	$ 425	$ 6,400
Machinery	63,184	192,462
Merchandise	3,124,782	3,734,087
Cash and debts receivable	1,654,938	1,712,319
Total	$4,843,329	$5,645,268
Liabilities:		
Capital stock	$ 100,000	$ 100,000
Accounts payable	4,743,329	5,545,268
Total	$4,843,329	$5,645,268

—

Driggs-Seabury to Build the Ritz Cyclecar

PITTSBURGH, PA., May 2.—A contract has been closed by the Driggs-Seabury Ordinance Corp., Sharon, for building the Ritz cyclecar. Work is to be started on the contract immediately. It will mean the employment of about 200 additional men. The company is building 5,000 Twombley cyclecars for the Twombly Car Corp., which has headquarters at 1790 Broadway, New York City.

—

How to Save in Exports to Spain

NEW YORK CITY, May 4—Automobiles imported into Spain are dutiable under the Spanish customs tariff on gross weight, which includes all packing and casing. European manufacturers avoid any excess charge by shipping automobiles uncased into Spain by rail or small steamer. One of the Madrid agents for American cars had a recent ship-

Market Reports for the Week

Tin was the most important change in this week's markets. More activity at lower prices prevailed this week in the tin market, when it came down to $33.05 per 100 pounds, at a drop of $1.65. Both coppers saw a small reduction. On Thursday Pennsylvania crude petroleum reduced 10 cents to $2 per barrel, while Kansas petroleum came down on Tuesday to $75, at 5-cent reduction per barrel. This reducing of prices seems to be the only available means of combating over-production. Cottonseed oil rose 12 cents a barrel with somewhat more active trading, but with a scattered demand. The New York market for fine Up-River Para was a small affair, lacking features of importance.

Material	Wed.	Thurs.	Fri.	Sat.	Mon.	Tues.	Week's Changes
Antimony	.05¾	.05¾	.05¾	.05¾	.05¾	.05¾	.....
Beams & Channels, 100 lbs.	1.26	1.26	1.26	1.26	1.26	1.26	.....
Bessemer steel, ton	20.00	20.00	20.00	20.00	20.00	20.00	.....
Copper, Elec. lb.	.14½	.14½	.14½	.14½	.14⅛	.14⅛	— .00$\frac{3}{16}$
Copper, Lake, lb.	.14⅜	.14⅜	.14½	.14⅜	.14¼	.14¼	— .00⅛
Cotton Seed Oil, bbl.	7.25	7.30	7.30	7.36	7.40	7.37	+ .12
Cyanide Potash, lb.	.17	.17	.17	.17	.17	.17	.....
Fish Oil, Menhaden, Brown	.40	.40	.40	.40	.40	.40	.....
Gasoline, Auto, bbl.	.16	.16	.16	.16	.16	.16	.....
Lard Oil, prime	.93	.93	.93	.93	.93	.93	.....
Lead, 100 lbs.	3.90	3.90	3.90	3.90	3.90	3.90	.....
Linseed Oil	.54	.54	.54	.54	.54	.54	.....
Open-Hearth Steel, ton	20.00	20.00	20.00	20.00	20.00	20.00	.....
Petroleum, bbl., Kans., crude	.80	.80	.80	.80	.80	.75	— .05
Petroleum, bbl., Pa. crude	2.10	2.00	2.00	2.00	2.00	2.00	— .10
Rapeseed Oil, refined	.59	.59	.59	.59	.59	.59	.....
Rubber, Fine, Up-River, Para	.74½	.74½	.74½	.74½	.74¼	.74½	.....
Silk, raw Ital	..	..	5.10	..	5.10	5.10	.....
Silk, raw Japan	..	..	4.42½	..	4.55	4.60	+ .11½
Sulphuric Acid, 60 Baume	.90	.90	.90	.90	.90	.90	.....
Tin, 100 lb.	34.70	34.25	34.40	34.00	33.75	33.05	—1.65
Tire Scrap	.04¾	.04¾	.04¾	.04¾	.04¾	.04¾	.....

ment billed from the United States to Gibraltar, where the packing and casing was removed. The cars were then taken across the bay to Algeciras, Spain, passed through the Spanish customs, and shipped by rail to Madrid. The agent in Madrid states that the net saving over the old way of billing from the New York to a Spanish port amounted to $72 per car. The cars are low-priced American cars selling in the United States at about $550.

—

Insurance Cost Under N. Y. Compensation Law

NEW YORK CITY, May 6—To determine what will be adequate rates of insurance for workmen's compensation risks in this state under the new law, the New York Insurance Dept. has prepared some very interesting data showing the probable net cost of insurance under that law, which becomes effective in this state on July 1.

At a meeting held in the offices of the State Insurance Department, May 5, an analysis of the New York law probable cost as compared with Massachusetts was made. It was shown that the cost per case under the Massachusetts compensation act is 50 per cent. of 1 week's wages, that is, for cases of temporary disability. The cost per case under the New York law is 66 2-3 per cent. of 1 week's wages.

The cost of permanent disability, not due to dismemberment, per case, in Massachusetts represents 50 per cent. of the weekly loss in wage earning power, payable for a period of 300 weeks, except in cases of total permanent disability, where indemnity is limited to $3,000, or to a period of 500 weeks. In New York State dismemberment cases will receive a fixed indemnity in lieu of all other compensation.

—

NEW YORK CITY, May 2—The A. R. King Mfg. Co. of Kingston, N. Y., which has been building the King truck for 2 years, has established offices at 50 Church street, this city. W. C. Hunter, formerly of the Alco staff, is in charge of the business here as New York sales manager. He is exhibiting and demonstrating a heavy duty 3 1-2-ton capacity truck of the short wheel base type with the motor under the foot boards. This company expects to build and market about 150 trucks of this type this year, and during the summer will bring out a 1 1-2-ton worm-driven truck for lighter duty.

—

New York to Los Angeles by Cyclecar

NEW YORK CITY, May 5.—Ivan Kelso will start this morning on a cyclecar trip to Los Angeles in company with his wife. He will leave this city in a Merz car. He expects to go by way of Albany, Buffalo, Cleveland, Detroit, Indianapolis, St. Louis, Santa Fe, Phoenix, Yuma and Los Angeles.

Automobile Securities Quotations

New York City, May 6—During the past week all the listed automobile, tire and accessory stocks showed slight gains though as a whole the market was not very active. Case stock was 5 points lower than last week, though its market is comparatively narrow. Electric Storage Battery Co. showed an increase of 3 and General Motors common a gain of 4.5. Goodrich common declined 1.5 points, although the preferred showed a gain of 1.5. Kelly-Springfield common lost 1 point due to the uncertainty as to the plan to be adopted in the financial readjustment of the company. Lozier remained unchanged but Maxwell common showed a gain of 1 1-8 points while the first preferred increased 6 3-4 and the second preferred 2 1-4. New Departure gained 2 1-3. Pope stock was weaker, the common having lost 1 point and the preferred 3. Studebaker common showed a gain of 1 point and the preferred an increase of 2, while the U. S. Rubber common was strong, the common gaining 4 3-4 and the first preferred 2 1-4 Willys-Overland common was off 3 points and the preferred 2. In the oils the Texas company gained 4 1-2 and Vacuum Oil lost 2.

	Wednesday		Thursday		Friday		Saturday		Monday		Tuesday		Week's	1913	
Security	Bid	Asked	Bid	Asked	Bid	Asked	Bid	Asked	Bid	Asked	Bid	Asked	Change	Bid	Asked
Ajax-Grieb Rubber Co. com	200	..	200	..	200	..	260	..	200	..	200	..	..	150	160
Ajax-Grieb Rubber Co. pfd	98	102	98	102	98	102	98	102	98	102	98	102	..	94	98
Aluminum Castings pfd	98	100	98	100	98	100	98	100	98	100	98	100	..	98	100
Case T. M. Co., J. I	80	82½	80	82	80	82	80	82½	80	82½	80	82½	—5	126	133
Chalmers Motor Co. com	..	82½	..	82½	..	82½	..	82½	..	82½	..	82½	..	..	..
Chalmers Motor Co. pfd	92	94	92	94	92	94	92	94	92	94	92	94	..	98	102
Electric Storage Battery Co	50	50½	50	50½	52½	53	52¾	53	52¾	53	52	52¼	+3	..	..
Firestone Tire & Rubber Co. com	283	288	283	288	283	288	283	288	283	288	283	288	..	260	266
Firestone Tire & Rubber Co. pfd	108	109½	108	109½	108	109½	108	109½	108	109½	108	109½	..	104	106
Garford Co. pfd	78	85	75	85	75	85	75	85	75	85	75	85	..	99	100½
General Motors Co. com	74½	76	77½	78	79⅝	80	79¼	80	79	79¾	79	79¾	+4½	26¾	29
General Motors Co. pfd	90	91	90	92	92	92½	91	91⅞	90	92½	90	92½	..	70	74
B. F. Goodrich Co. com	25¾	25⅞	26½	26⅞	26½	26⅞	26	26¾	25⅞	26	25⅞	26	—1½	30	31
B. F. Goodrich Co. pfd	88	89½	88	89½	89	90	89⅞	90¼	89	91	89	91	+1½	94	97
Goodyear Tire & Rubber Co. com	168	172	168	172	168	172	168	172	168	172	168	172	..	310	322
Goodyear Tire & Rubber Co. pfd	94	95½	94	95½	94	95½	94	95½	94	95½	94	95½	..	100	101½
Gray & Davis Co. pfd	90	97	90	97	90	97	90	97	90	97	90	97	..	..	..
International Motor Co. com	..	5	..	5	..	5	..	5	..	5	..	5	..	5	10
International Motor Co. pfd	..	15	..	15	..	15	..	15	..	15	..	15	..	20	40
Kelly-Springfield Tire Co. com	52	54	52	57	52	57	51	55	52	53	52	53	—1	..	..
Kelly-Springfield Tire Co. pfd	135	140	130	135	130	135	132	135	135	140	135	140	..	..	..
Lozier Motor Co. com	..	30	..	30	..	30	..	30	..	30	..	30	..	..	..
Lozier Motor Co. pfd	..	55	..	35	..	35	..	35	..	35	..	35	..	..	..
Maxwell Motor Co. com	8	8½	7	7⅞	7	7⅜	9⅛	9¼	9½	9⅝	8⅞	9⅛	+1⅛	3	5
Maxwell Motor Co. 1st pfd	34	35	38	39	38	39	40	40½	40	41	40	41	+6¾	40	50
Maxwell Motor Co. 2d pfd	12	13	14	14¾	14	14¾	15¼	15½	15	15½	14¾	15⅛	+2¼	12	16
Miller Rubber Co	131	140	131	140	131	140	131	140	131	140	131	140	..	155	160
New Departure Mfg. Co. com	122	124	122	124	122	124	122	124	122	124	122	124	..	..	..
New Departure Mfg. Co. pfd	105½	107	105½	107	105½	107	105½	107	105½	107	105½	107	+2½	..	..
Packard Motor Co. com	103	..	103	..	103	..	103	..	103	..	103	..	..	..	..
Packard Motor Co. pfd	94	98	94	98	94	98	94	98	94	98	94	98	..	..	..
Peerless Motor Co. com	18	25	18	25	18	25	18	25	18	25	18	25	..	35	45
Peerless Motor Co., pfd	..	70	..	70	..	70	..	70	..	70	..	70	..	95	100
Pope Mfg. Co. com	1	3	1	3	1	3	1	3	1	3	1	3	—1	16	20
Pope Mfg. Co. pfd	7	12	7	12	7	12	7	12	7	12	7	12	—3	52	56
Portage Rubber Co. com	..	30	..	30	..	30	..	30	..	30	..	30	..	35	41
Portage Rubber Co. pfd	..	85	..	85	..	85	..	85	..	85	..	85	..	85	90
*Reo Motor Truck Co	8¾	9¼	8¾	9¼	8¾	9¼	8¾	9¼	8¾	9¼	8¾	9¼	..	11⅝	12⅛
*Reo Motor Car Co	20¾	21½	20¾	21½	20¾	21½	20¾	21½	20¾	21½	20¾	21½	..	20¾	21¾
Rubber Goods Mfg. Co. pfd	..	..	100	110	100	110	100	110	100	110	100	110	..	..	..
Russell Motor Co. com	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Russell Motor Co. pfd	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Splitdorf Electric Co. pfd	40	50	40	50	40	50	40	50	40	50	40	50	..	..	..
Stewart Warner Speedometer Corp. com	50	53	50	53	50	53	50	53	50	53	50	53	..	..	..
Stewart Warner Speedometer Corp. pfd	97	100	97	100	97	100	97	100	97	100	97	100	..	..	..
Studebaker Co. com	32½	33	32½	33	33⅞	34½	33⅝	33⅞	33½	34	33½	34	+1	27½	29
Studebaker Co. pfd	83	86	83	86	83	86	85	87	85	87	85	87	+2	88	90
Swinehart Tire & Rubber Co	62	66	62	66	62	66	62	66	62	66	62	66	..	84	87
Texas Company	140	141¾	140	141½	143¼	145	143¾	145	143½	145	143½	145	+4½	..	..
U. S. Rubber Co. com	55	56	55	56	56¾	57	56¾	57½	58¼	58½	58¼	58½	+4¾	60	61
U. S. Rubber Co. 1st pfd	100½	100⅞	100½	100⅞	101½	102	101⅛	102	101¾	102⅜	101¾	102⅜	+2¼	103½	104
Vacuum Oil Co	218	225	223	228	223	228	225	230	225	230	215	218	—2	..	..
White Co. pfd	107	110	107	110	107	110	107	110	107	110	107	110	..	107	109
Willys-Overland Co. com	64	66	58	62	58	62	58	62	58	62	58	62	—3	57	62
Willys-Overland Co. pfd	89	94	87	92	87	92	87	92	87	92	87	92	—2	90	97

*The par value of these stocks is $10; all others $100.

Mayo Estate Gets Knox Co., Bidding $631,090—A Contest

Other Creditors Displeased at Sale for $900,000 Under Appraised Value—Plant to Continue

SPRINGFIELD, MASS., May 2—Referee Charles W. Bostwick today formally approved the sale of the Knox Automobile Co. to Edward O. Sutton but not for the amount of his original bid, which was $350,000.

The acceptance by the referee was in the face of a strenuous protest from Attorney John P. Wright, of Boston, representing creditors who, among other things, claimed that "the proceedings under which the sale was authorized were invalid, that the order of the referee in bankruptcy was invalid, that the trustee in bankruptcy has no title to the property" and that the "necessity for selling all of the property does not exist."

Subsequent to the rejection of his first bid, and as a result of the pressure which was brought to bear upon Sutton by interests closely connected with the Mayo estate, which he represents, Sutton increased his bid to $631,090, for which figure the plant was struck down to him. He has announced his intention of continuing the manufacture of cars as at present.

Wright has stated that he will file with Judge Norton, of the United States district court at Boston, a petition for the revocation of the adjudication in bankruptcy.

The case came before Referee Bostwick in the form of three petitions from the trustee. These petitions ask that Sutton's bids of $200,340 for the real estate, $180,750 for the machinery and equipment and $250,000 for the balance of the property be approved. The only other bid made was $325,000 by a representative of a Chicago house wrecking firm.

In addition to the price of the sale, there remains assets not sold in the form of cars awaiting deliveries, and cash and receivables, which will total about $146,000, making a grand total of about $770,000. From this there is $300,000 for bills, taxes, royalties and other liabilities as well as the actual expenses of administration of business by the trustee to be deducted.

Prior to the approval of the sale, it was brought out that in his efforts to get bids for the property Attorney Gardner has interviewed a number of men prominent in the industry, among whom were the treasurer of the International Harvester Co., representatives of the John Deere Plow Co., general manager of the Velie Motor Vehicle Co., vice-president of the General Motors Co., vice-president of the Studebaker Corp. and the vice-president of the White Co.

In protesting the sale, Attorney Wright pointed out that the original appraisal had been $1,682,000 and that the amount realized was about $900,000 less than the appraised value. He claimed that the sale price was inadequate.

—

EAST PALESTINE, O., April 30—R. F. Taggart has retired from the board of directors of the McGraw Tire & Rubber Co., and has been succeeded by F. B. Squire of Cleveland. At a meeting of the board of directors on May 1, action was taken to provide for the increase of the capital stock of the company from $1,000,000 to $1,500,000. The company is now employing 600 men and operating the plant day and night with an average monthly pay roll of $50,000. President E. C. McGraw estimates the 1914 business to reach between $4,000,000 and $5,000,000.

—

American Co. Dead; Assets Distributed

CHICAGO, ILL., April 30—Although it was hoped that a company would be organized for the purpose of bidding in the property and assets of the American Motors Co., which were bought some time ago by Samuel L. Winternitz & Co., Chicago auctioneers, who purchased it for speculative purposes, all hope was disseminated today when the good-will of the bankrupt company patents, jigs, dies, etc., passed to the Levene Motor Co., of Philadelphia, for $4,000. Subsequently all of the supplies, finished cars and parts were struck down to the Auto Parts Co., Chicago, Ill.; hence the American Motors Co., as a manufacturer, has passed out of existence.

According to the announcement of the Levene company, it will continue the sale of parts and service for the approximately 45,000 Americans now in use. For this purpose, the purchased parts will be removed to the building occupied by the American Motors Co. of Philadelphia.

The sale was conducted by Winternitz and the bidding was spirited, about 200 persons attending the sale. Practically all of the Indianapolis motor car factories, and many from throughout Indiana and other states, were represented at the sale.

The supplies and parts taken over by the Auto Parts Co. consisted of about 50 new and used cars, all fully equipped, and more than $250,000 worth of finished parts, accessories, material, etc. The cars and parts will be placed on sale at the following prices: 4-cylinder new motors, $100; 6-cylinder new motors, $200; American Scout, $600; underslung roadster, complete, $900.

—

Top Bid for Herreshoff in Abeyance

DETROIT, MICH., May 5—Although the Lycoming Foundry & Machine Co., Williamsport, Pa., was highest bidder with an offer of $69,500 for the entire property of the Herreshoff Motor Co. at the receiver's sale, May 1, the Lycoming company has not yet become the possessor of the plant. When the matter came up before Referee Lee Joslyn today he declined to confirm the bid and a further hearing will be held May 14.

The Detroit Trust Co., the receiver, considers the amount low, inasmuch as the real estate and buildings were appraised at $98,000 and the other property at $40,000, a total of $138,000, while the inventory figures are naturally even higher than this. The Lycoming company is the largest creditor.

The real estate consists of a modern plant at 2284-2308 Woodward avenue, Detroit, fronting 264 feet on Woodward avenue and running back 200 feet; it is clear of all liens and encumbrances. The personal property consists of all stock in trade except accounts and bills receivable and embraces finished and partly finished cars, materials, supplies, accessories, patterns, blueprints, machinery, tools, furniture and fixtures.

—

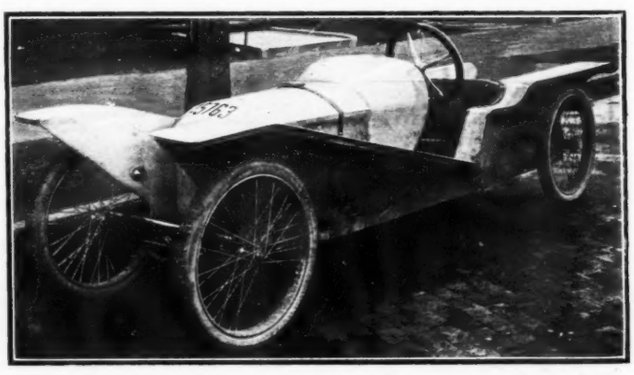
No Receivership for Standard Electric

DETROIT, MICH., May 5—Despite the pleas of a number of stockholders who had asked that a trustee be appointed for the Standard Electric Car Co., Jackson, Mich., Judge Tuttle in the Federal court has refused to appoint a receiver.

The petition was filed in the name of E. C. Devine, Chicago, and in addition to making a defendant of the Standard Electric Car Co., made a defendant also of the Standard Car Mfg. Co., under which name the electric company was reorganized last November.

According to officials of the Standard Car Mfg. Co., the petition was due to ill feeling on the part of Devine. Devine, it is said, represents a minority group of stockholders who first became dissatisfied when C. F. Krueger was discharged as manager of the company in the spring of 1913. Following Krueger's discharge an audit of the books revealed that the financial condition of the company was such that reorganization was necessary.

The Standard Car Mfg. Co. was formed, purchased the personal assets of the old company and introduced $50,000 in new capital, in addition to assuming the liabilities of the old company, which amounted to $150,000. At that time, the Krueger faction declined to affiliate itself with the reorganized company because, according to Thomas E. Barkworth, the company's attorney, it could not dispose of its stock in the old company nor transfer it for stock in the new company.



Twin City cyclecar to be made by C. H. Scholer, of Minneapolis, Minn.

Franklins Average 32.8 m.p.g. In Nation-Wide Competition

High Mileage Is 51.2 and Low, 17.2—Certified Results of 94 Tests Show Economy

SYRACUSE, N. Y., May 1—The nation-wide gasoline consumption test for Franklin cars held today by dealers in this car all over the country resulted in an average mileage per gallon of 32.8. The lowest mileage obtained was in Georgetown, Texas, where the driver had to contend against rainy weather and secured 17.2, and the highest was in Milwaukee, Wis., where the driver favored by fair weather conditions managed to jockey his car to the extent of 51.2 miles on the measured gallon.

The high average obtained speaks well for the economy of the Franklin car, as the test was made under circumstances and rules that put the test on a non-competitive basis. All the results were sworn to before notary publics, and the test represents the results obtained by ninety-four men who tried to get the best possible mileage out of their respective cars. The table of certified individual records is given herewith.

—

Chandler Six Does 24.4 Miles a Gallon

CHICAGO, ILL., May 2—A Chandler Six, equipped with a Rayfield carbureter, yesterday established a record of 24.4 miles per gallon of gasoline in a combined economy and efficiency test arranged by the Findeisen & Kropf Mfg. Co., and conducted by officials of the Chicago Automobile Club. In spite of the excellent showing as to consumption, the test was more than an economy one as power and speed tests were made as well, which indicated that the mixture in the carbureter had not been weakened to a point at which those items were sacrificed in order to gain great economy. The Chandler Six used in the test was the demonstrating car owned by Thomas Hay, the local distributor. It has 3 3-8 by 5-inch cylinders, Bosch magneto, and a Rayfield G-3 1 1-4-inch carbureter. Tires are 34 by 4 inches and an extra tire and rim were carried. The car weighed 3,700 pounds with four passengers in it and 3,530 without passengers.

When the economy test started the main gasoline line was disconnected and a special tank substituted. Into this a measured gallon of gasoline was poured and the car driven at a speed of 20 miles per hour over Chicago's boulevard and park system. Not once during the run was the clutch released so that there was no coasting. In making this mileage the windshield was down with the exception of the first two miles.

Without any adjustments of the carbureter or any other change the machine was driven to Hubbard's Hill to display its hill-climbing ability. Starting at a rate of 8 miles per hour on high gear, the machine went up the hill finishing at 20 miles per hour. From the standing start, the car finished at 20 miles per hour.

On a flexibility test still with the same adjustments, the car was capable of speeds as high as 45 miles per hour and as low as 3 miles per hour. The tests were made under the supervision of F. E. Edwards, chairman, and Darwin S. Hatch of the Chicago Automobile Club's technical committee. The car was piloted by W. C. Gruner, who won fame with the Ford in Algonquin hill climbs. Even a better showing, probably would have been made had the weather conditions been more favorable. The thermometer registered 51 degrees Fahrenheit and a strong cold wind was blowing.

—

Twin City a Side-by-Side Car

CHICAGO, ILL., May 2.—The Twin City cyclecar, announced by C. H. Scholer of Minneapolis, is a side-by-side car on 36-inch tread and driven by a four-cylinder air-cooled piston valve motor.

This car has just completed tests and has shown good performance over several hundred miles of running. The drive is by shaft, friction and chain, the friction layout being at the rear of the seats, a short chain connecting to a solid axle.

The car is mounted on coil springs as shown in the photograph, and is very simple in construction throughout. The fenders are arranged in an unusual way to give maximum protection and yet allow passengers to get in easily.

—

Prigg Co. to Make Cycle Cars

INDIANAPOLIS, IND., May 2—Indiana, which is now one of the principal cyclecar manufacturing centers in the United States, is to have still another cyclecar factory. This is to be established at Anderson by the newly-organized H. Paul Prigg Co., which has an authorized capitalization of $100,000.

No delay is to be had in getting a modern plant into full operation, and it is expected that cyclecars will be ready for the market in a short time. Those who are interested in the company are S. M. Prigg, H. Paul Prigg and F. S. Sheets.

Table of Results of Nation-Wide Franklin Economy Test

City	Dealer	Weather	Record
Milwaukee, Wis.	Wm. F. Sanger	Fair	51.2
Cumberland, Md.	A. E. Glisan	Fair	50.9
Boston, Mass.	Otto A. Lawton	Fair	49.5
New Haven, Conn.	Cowles Tolman	Fair	48.5
Seattle, Wash.	W. A. Wicks	Fair	43.0
Kansas City, Mo.	E. F. Williams	Cool	42.9
Minneapolis, Minn.	L. A. McKay	Windy	42.8
Spokane, Wash.	J. A. Nichols, Jr.	Windy	42.5
Elizabeth, N. J.	F. V. Price, Jr.	Windy	41.2
Syracuse, N. Y.	T. A. Young	Windy	40.3
Salt Lake City, Utah	J. E. Langford	Wet	40.1
Canton, Ohio	Geo. W. Belden	Fair	39.9
Sioux City, Ia.	Thomas Murphy	Fair	39.6
New York City	G. A. Tisdale	Windy	39.4
Akron, Ohio	A. Auble, Jr.	Windy	39.3
Portland, Ore.	J. C. Braly	Fair	39.1
Philadelphia, Pa.	James Sweeten, Jr.	Windy	38.3
Winnipeg, Man.	James B. Stephens	Fair	38.0
St. Louis, Mo.	Jos. B. Dryer	Fair	37.9
York, Pa.	T. S. Pfeiffer	Windy	37.9
Cincinnati, Ohio	Newman Samuel	Fair	37.3
Springfield, Mass.	W. W. Anderson	Fair	36.8
Auburn, N. Y.	George H. Leonard	Windy	36.6
Hoosick, N. Y.	John Moseley	Fair	36.5
San Francisco, Cal.	John F. McLain	Windy	36.1
Bar Harbor, Me.	Fred L. Savage	Fair	36.1
Baltimore, Md.	W. F. Kneip	Windy	36.0
Charlotte, N. C.	J. B. Woodside	Windy	36.0
Geneva, N. Y.	W. W. McCarroll	Fair	35.7
Hagerstown, Md.	H. E. Baker	Fair	35.3
Waterloo, Ia.	R. H. Cramer	Wet	35.1
Louisville, Ky.	George M. Younger	Fair	35.1
San José, Cal.	L. Normandin	Fair	34.9
Rochester N. Y.	G. R. MacCollum	Windy	34.8
Los Angeles, Cal.	R. C. Hamlin	Rain	34.8
Providence, R. I.	Wallace L. Wilcox	Windy	34.4
Newark, N. J.	W. L. Mallon	Fair	34.4
Bridgeport, Conn.	Arthur L. Clark	Windy	34.4
Worcester, Mass.	V. J. Eckberg	Windy	34.3
Little Rock, Ark.	J. F. Jones	Fair	34.1
Walla Walla, Wash.	R. H. Tuttle	Windy	34.0
Newburgh, N. Y.	George Mason	Fair	33.9
Hartford, Conn.	H. P. Seymour	Windy	33.8
Pendleton, Ore.	J. W. McCormmach	Fair	33.8
Putnam, Conn.	O. C. Bosworth	Windy	33.3
Dayton, Ohio	F. B. Heathman	Fair	33.2
Albany, N. Y.	C. G. Heck	Windy	33.1
San Diego, Cal.	Wilson S. Smith	Rain	33.1
Binghamton, N. Y.	S. H. Lewis	Fair	32.8
Duluth, Minn.	D. Peacha, Jr.	Windy	32.7
St. Paul, Minn.	A. H. Clark	Fair	32.5
Washington, D. C.	David S. Hendrick	Windy	32.4
Peoria, Ill.	S. K. Hatfield	Fair	32.2
Laramie, Wyo.	E. Lovejoy	Fair	32.1
Kingston, N. Y.	William M. Davis	Windy	31.7
Scranton, Pa.	O. D. DeWitt	Fair	31.7
Poughkeepsie, N. Y.	William M. Davis	Windy	31.6
Wilkesbarre, Pa.	William S. Lee	Windy	31.5
Oakland, Cal.	Frank Bartels	Windy	31.5
Great Falls, Mont.	B. D. Whitten	Fair	31.4
Chicago, Ill.	F. H. Sanders	Fair	31.3
San Antonio, Tex.	L. F. Birdsong	Rain	30.8
Pittsburg, Pa.	W. Murray Carr	Fair	30.5
Erie, Pa.	John Griffith	Windy	30.5
Utica, N. Y.	W. W. Garabrant	Windy	30.4
Edmonton, Alta.	Holland W. Ross	Fair	30.3
Norwich, N. Y.	A. M. Jones	Windy	30.0
Colorado Springs, Col.	G. W. Blake	Rain	30.0
Dallas, Texas	W. G. Langley	Windy	29.9
Sheboygan, Wis.	N. P. Hanson	Windy	28.6
Phoenix, Ariz.	George Hageman	Rain	28.6
Sioux Falls, S. D.	Knapp Brown	Fair	28.1
Reading, Pa.	James M. Kalbach	Fair	27.8
Buffalo, N. Y.	George Ostendorf	Windy	27.7
Youngstown, Ohio	J. Stuhldreher	Windy	26.4
San Angelo, Texas	M. C. Ragsdale	Rain	26.3
Denver, Col.	F. C. Cullen	Rain	26.3
Washington, Ia.	Sidney S. Smith	Fair	26.2
Portland, Me.	W. M. Chellis	Fair	26.2
Greensburg, Pa.	E. L. Turner	Fair	25.7
Paterson, N. J.	J. S. Hughes	Fair	25.1
La Crosse, Wis.	Alfred James	Fair	25.0
Hutchinson, Kans.	L. B. Young	Fair	25.0
Tulsa, Okla.	W. P. Chapple	Fair	24.8
Rising Sun, Ohio	E. F. Day	Windy	24.0
Shreveport, La.	W. H. Johnson	Fair	23.7
Eau Claire, Wis.	G. R. Wood	Fair	23.7
Grand Rapids, Mich.	John Vlasblom	Fair	22.5
Victoria, B. C.	G. H. Grant	Fair	22.0
Bangor, Me.	Edwin O. Hall	Windy	21.5
Galesburg, Ill.	E. T. Byram	Fair	20.2
Uniontown, Pa.	C. W. Johnson	Windy	18.9
Aberdeen, S. D.	G. M. Worthington	Fair	18.3
Georgetown, Tex.	T. J. Caswell	Rain	17.2
	Average		**32.8**

Peugeot Team Sails Secretly—Speedway Hums with Activity

Oldfield Predicts Broken Records for 500-Mile Race — Beaver Bullet to Use Airless Tires—Entry List Inverted in Elimination Trials—G & J Shield Again To Be Won—Complete Entry List

INDIANAPOLIS, May 5—So much is happening at the Speedway that it is necessary to serve the news of the coming 500-mile race Mexican style, in short war bulletins:

Goux and Boillot, Peugeot champions, sailed secretly from Cherbourg on the Olympic April 29, to be at practice before their French team mates. All were supposed to embark May 9.

Charles F. Keene and C. F. Rogers, entrants of the Beaver Bullet, are at the track for first workouts. They propose to use airless tires through the race to escape tire changing.

Barney Oldfield, first of racing stars "on the scene," forecasts the explosion of the 78.7 miles per hour record on account of the brilliance of the field. Oldfield races at Brighton Beach May 22, 23 and 24.

In order to protect early entries the order in the elimination trials will be inverted; that is, the last to enter will be the first in the qualifying spurts. Early entries will therefore be able to keep surprises up their sleeves, having only to excel the announced time of the cars that precede.

Elimination trials begin at 10 o'clock May 27, continuing until dusk, then starting the morning of May 28. As soon as the trials are finished the speedway will be "sealed" and workmen begin the scrubbing of the track.

It is said that Alphonse Kaufmann, Peugeot representative in New York City, has posted a $10,000 wager on Boillot for first place, with Goux second choice.

All of the trophies won by Goux last year have been returned to the Speedway management for further "argument" on Decoration Day. The prizes include the Remy trophy and brassard for 200 miles, the Prest-O-Lite silver brick for 300 miles, and the Wheeler-Schebler $10,000 cup for 400 miles. The famous G & J shield for 100 miles, which could not be located last year, has been recovered from a Falcar dealer who held it after the disqualification of the Marquette-Buick in 1910. It is again up for winning.

Complete entries are:

No.	Car	Cyl.	B. & S.	P. Disp.	Driver
1	Burman	4	5.1x5.5	449.4	Burman
2	Stutz	4	..	..	Cooper
3	Stutz	4	..	..	Oldfield
4	Gray Fox	4	5 x5.5	431.9	Wilcox
5	Beaver Bullet	4	5.1x5.5	449.4	Keene
6	Peugeot	4	3.9x7	341.7	Goux
7	Peugeot	4	3.9x7	341.7	Boillot
8	Maxwell	4	4.2x8	445	Tetzlaff
9	Sunbeam	6	3 x5.9	245	Chassagne
10	Delage	4	4.1x7	380.2	Guyot
12	Excelsior	6	3.8x6.2	446.6	Christiaens
14	Peugeot	4	3 x6.1	183	Duray
15	King	4	5.1x5.5	449.4	Klein
16	Delage	4	4.1x7	380.2	Thomas
17	Burman	4	5.1x5.5	449.4	..
18	Mercedes	6	4.1x5.5	445	DePalma
19	Mercer	4	4.8x6.2	445	Wishart
21	Mercer	4	4.8x6.2	445	Bragg
22	Mercer	4	4.3x5	300	Pullen
23	Mercedes	4	4.4x7.2	448	Mulford
24	Stutz	4	..	..	Anderson
25	Maxwell	4	4.2x8	445	Carlson
26	Marmon	4	4.5x7	445	Dawson
27	Sunbeam	6	3.1x5.9	273	Grant
28	Stafford	4	4.2x5.1	290.7	Callahan
29	Metropol	4	4.2x7.1	446	Horan
31	Keeton	4	5.1x5.5	449.4	..
32	Maxwell	4	4.2x8	445	..
33	Texas	4	5.1x5.5	449.4	Clark
34	Bugatti	4	3.9x7.1	350	Friedrich
35	Great Western	4	4.2x8	445	Jenkins
36	Great Western	4	3.7x5.7	254	Price
37	Great Western	4	4.2x8	445	..
38	Braender Bull Dog.	4	4.4x6	350	Chandler
39	Pope Bullet	4	4.7x5.7	407	Roberts
41	Washington	4	4.7x5.7	407.6	Stringer
42	Duesenberg	4	4.4x6	360.5	Rickenbacher
43	Duesenberg	4	4.4x6	360.5	..
44	Mason	4	4.4x6	360.5	Mason
45	Tatter	4	4.1x5.3	286	Mazzucco
46	Rayfield	6	4.1x5.5	442.6	Hughes
47	Titze	4	5.1x5.5	449.4	..
48	Ray	4	5.1x5.5	449.4	Brock
49	Isotta	4	4.7x6.3	443.8	..

Another grandstand is to be built at the south turn of the speedway on account of the heavy advance sale. This makes the eighth pavilion with practically a mile of frontage and a total capacity of 60,000 persons. The seating is being closely inspected by state officials. Two new stands, a big tunnel under the south end of the track to the infield and the addition of a number of garages and camp cottages will be noticed as 1914 improvements at the speedway.

$9,225 in Accessory Prizes for Indianapolis

NEW YORK CITY, May 4—The Longuemare Carburetor Co., New York City, has come forth with an offer of $1,600 in prizes at the Indianapolis 500-Mile Race, to be held on May 30. This makes the total accessory prize money $9,225. The other accessory firms contributing prize money to Indianapolis winners, using their products, exclusively are as follows: the Emil Grossman Co., this city; Bosch Magneto Co., this city; Rudge-Whitworth, Ltd., Coventry, England; Wheeler & Schebler, Indianapolis, Ind.; Findeisen & Kropf, Chicago, Ill.; and the J. B. Carburetor Corp., Los Angeles, Cal.

The Longuemare company reports the following cars to date, are equipped with its carbureter: Peugeot, Boillot; Peugeot, Goux; Sunbeam, Chassagne and the Isotta, Gilhooly.

MINNEAPOLIS, MINN., May 2.—The Northern Welding Co., Minneapolis, will send a portable Vulcan welding outfit to the Indianapolis speedway for use at the time of the 500-mile race May 30. Manager L. E. Jordan and his mechanician, C. L. Williamson, will manage the operation of the machine.

Thirty "Cykes" in Run to Indianapolis

DETROIT, MICH., May 5—When the cyclecar run out of Detroit and Chicago reaches Indianapolis, progress of the cyclecar industry will be clearly manifest, as fully thirty manufacturers will be represented in the tour. The Chicago Cyclecar Club has twelve entries and will probably have twenty or more, and the Detroit Cyclecar Club has already received twenty. The Cyclecar Club of Buffalo will ship from that city to Detroit and join the Cyclecar Club of Detroit in the trip May 28 to South Bend, where the two organizations will meet the Cyclecar Club of Chicago. The three organizations will travel in company to Kokomo and at that point meet the Hoosier Cyclecar Club, which will escort the tourists into Indianapolis, around the city and to Monument Circle, where the cars will be placed on exhibition and where parking arrangements have been arranged for.

INDIANAPOLIS, IND., May 4—It has been decided definitely by the Indiana Automobile Manufacturers' Assn. that it will abandon the tour it had expected to make beginning July 1. The association has been making summer tours annually, but there are a number of reasons why one will not be undertaken this summer. There is some talk of a fall tour, but this has not been decided one way or another.

A meeting of the association was held here last week at which the proposition was gone over carefully. There were two routes under consideration, one of which would have terminated in Texas and the other in Nebraska. It was decided the first route was impractical because of heat, bad roads and rain, and that the second would be impractical because the territory has been covered so thoroughly by the association.

If a fall tour is given, it probably will be to Texas or Cuba. Should a trip to Cuba be decided upon, the route would lie through Kentucky, Tennessee, Georgia and Florida and ship from Key West to Havana.

Car Show at Indiana State Fair?

INDIANAPOLIS, IND., May 4.—A committee consisting of F. I. Willis, John Orman and G. O. Wildhack has been ap-

pointed by the Indianapolis Automobile Assn. to investigate the feasibility of holding a fall show in connection with the Indiana State Fair.

The fair will be held in this city September 7 to 11. There is no building available for a motor car show, but the motor car association still has the immense tent that was used for the annual motor car show in the spring of 1912. It is proposed to take this tent to the fair grounds and in it house the exhibits of local manufacturers and dealers.

The attendance at the state fair is usually from 150,000 to 200,000, bringing people to the city from all parts of Indiana. A motor car show was held in March, but it is thought that a fall show would be a great help to business. A boulevard one hundred feet wide is now under construction to the fairground and this will be completed in time for the fair.

A report is to be made to the Indianapolis Automobile Trade Assn. by the committee appointed to investigate the show question, this month.

Milwaukee Inter-Club Run June 20

MILWAUKEE, WIS., May 5—The Milwaukee Athletic Club will engage the Milwaukee Automobile Club in competition for the Wisconsin Motorist trophy for the second time on Saturday, June 20, according to plans made by the joint contest boards on May 2. A route of approximately 130 miles will be laid out, covering a number of the interior towns of the state. Rules equal to grade 3 regulations of the A. A. A. will govern the run and the club team finishing with the least demerits will receive the trophy. The automobile club won the plaque in the first contest on June 28, 1913, by a big score. It was at first proposed to conduct a two-day run, but the contest boards decided to make the June 20 contest a one-day affair and hold another in the fall. In the last contest 22 cars participated, each club being represented by 11 cars, and there were 8 perfect score cars on each side.

Philadelphia Cyclecar Show Opens

PHILADELPHIA, PA., May 2—Philadelphia's first annual light car show opened tonight and will continue every afternoon and evening for one week. The exhibition is being held in the ballroom of the Hotel Majestic, Broad street and Girard avenue, and consists of cyclecars, light motor cars, accessories and motorcycles. Although space is somewhat limited the show comprises such makes as Car-Nation, Grant, Metz, Twombly, Trumbull and others. In connection with the show a "Motor Tango" will be held next Monday, Wednesday and Thursday evenings.

Eastern Cyclecarists to Cape May

NEW YORK CITY, May 4.—At the regular monthly meeting of the Cyclecar Club of New York, held on May 1, it was planned to have the local club combine with the Cyclecar Club of New England and the Cyclecar Club of New Jersey in a run up to Cape May, to attend the S. A. E. summer meeting on June 23-26.

Hupmobile and Jeffery Enter Non-Motor-Stop Reliability

Tom Hay Devises Agency Relay in Stock Class—A. M. Robbins in Owners' Division

CHICAGO, ILL., May 4—The first entry for the American Automobile Assn. 1914 national tour, promoted by the Chicago Automobile Club and better known as the Chicago-Boston day and night non-motor-stop reliability has been received, the nomination being filed today by Thomas J. Hay, Chicago agent for the Hupmobile, who declares a touring car of that make in the $1,200 and under division of the stock car class.

In making this entry Hay is counting on the co-operation of Hupmobile agents between Chicago and Boston. Also he has in mind defending the Anderson trophy which now is held by the Hupmobile and which was won in last year's Glidden tour to Glacier park. The Hupmobile is the first of last year's winners of national tour trophies to be elected to defend the historic cup.

Hay figures that his scheme will arouse more national interest than if the entry were made by the Hupp company direct. He proposes to have the other dealers share in the expense and help put the car through. Hay will drive it in that part of the tour that runs through his territory. He will turn it over to the next Hupmobile agent who will pilot the car to the end of his territory. In this way the car probably will be handled by at least a half dozen agents before it gets to Boston.

The first entry also has been received for the owners' class in which the National trophy is offered. The declaration is made by A. M. Robbins, agent for the Jeffery in Chicago. It is a personal entry and Mr. Robbins gets in this class by virtue of the rule that permits makers and dealers to compete in it provided they own their own cars and take their turn at the wheel.

Newark Cyclecar Club Plans Meet

NEWARK, N. J., May 4.—On May 30 the Cyclecar Club of New Jersey will hold the first cyclecar meet ever held in the U. S. at Teaneck, N. J. The program will consist of a pint fuel event; a hill climb on a 7 to 1 grade; a reverse gear, up-hill event; a low gear, miles-per-hour event; and starting contest with motors cold. There will be three classes to each event—cyclecar, light car and small car. Ratings according to piston displacement and weights as adopted by the Cyclecar Mfrs. National Assn. will be made, and R. F. Kelsy will be referee. The winners of the most number of points for the day will receive the McIntyre silver trophy cup presented by W. H. McIntyre, president of the cyclecar association.

Cyclecar Assn. Proclaims Its Control of Contests

Cyclecar Test in Massachusetts May 30

BOSTON, MASS., May 1—At a meeting of the New England Cyclecar Association held last night at its quarters in the Hotel Oxford plans were made for the run that is to take place May 30-31 through Massachusetts. The officials stated that there are now entered 30 cyclecars, and more are expected as the entry list will not close until just before the start. A very hard route has been picked out to show the reliability of the little machines, and in the two days running they will cover more than 200 miles. On the holiday the start will be made from Boston at 9 a. m. and then the route will be through South Framingham and Marlboro to Worcester where the machines will check in at 12.15. An hour will be spent for luncheon and then the run will continue through the Brookfields, Spencer, Warren, Palmer to Springfield, the night stop. The cars will check in there at 5.30. The distance is about 100 miles over the road.

That night there will be a banquet at the Kimball hotel, and it will be arranged to exhibit the various makes of cyclecars in the foyer or about the hotel somewhere so that it will take on the semblance of a cyclecar show. On Sunday morning the cars will be started back at 9.15 over another route. They will go through Chicopee, Holyoke, Easthampton, Northampton, South Deerfield, Deerfield, Greenfield, Millers Falls, Athol, Templeton, Gardner to Fitchburg. The cars will be due there at 2 o'clock. They will stay there until 3.30 dining and being entertained at the Johnsonia hotel. Then the final leg of the run will be made through Leominster, Lancaster, Clinton, South Framingham, Wellesley, Needham, Dedham, Hyde Park to Boston where they are due at 7 p. m. The committee has ordered 200 banners and flags.

A. A. A. Cyclecar Control Denied

DETROIT, MICH., May 3—Four-fifths of all the cyclecar manufacturers of the United States and a large number of the cyclecar clubs have declared for independence in the management of the cyclecar sport and also cyclecar pastime.

When it was formed the Cyclecar Association of America passed a resolution which had for its intent the arrangement to work in entire harmony with all sport-controlling bodies of the world.

In a recent ukase the association announces that racing and touring events will be sanctioned by the C. A. A. in the future.

It is said that a great majority of the members of the Cyclecar Manufacturers National Association, of which W. H. McIntyre of Auburn, Indiana, is president, have pledged their support to the C. A. A.

Factory Miscellany

DETROIT Tire Co. in Springfield—The Detroit Pneumatic Tire Mfg. Co., Detroit, Mich., has practically closed a deal whereby it will locate its factory in Springfield, Ill. It will involve an investment of more than $500,000. The company, it is said, will erect a brick building, at a cost of $40,000, and install machinery aggregating an outlay of over $500,000.

Gray & Davis Reduces Working Hours—Gray & Davis, Boston, Mass., announces that it has shortened its factory time schedule to 50 working hours per week, instead of 52, as heretofore.

Valve Co. Will Manufacture—Auto Valve Co., Ironton, O., has been incorporated with $10,000 capital stock by Otto Ebert, and others. A small factory will be fitted up for the manufacture of an automobile specialty.

Beaver Plant Completed—The first factory building for the Beaver State Motor Co., Gresham, Ore., has been completed and accepted. A blacksmith shop and power house will be erected immediately. P. A. McComb is president.

Dayton Cycle Car Co. Locates—The Dayton Cycle Car Co., Joliet, Ill., has made arrangements to occupy a plant on McDonough street and expects to be equipped by June for operations on a scale necessitating the employment of 100 men.

Regal-Nyberg Canadian Factory—A new automobile industry will be established this summer at Berlin, Ont. The Regal Automobile Co., Detroit, Mich., will amalgamate with the Nyberg automobile works, Anderson, Ind., in the establishment of a Canadian factory.

Ford Plant for Montreal—At a cost of $180,000, a large factory for assembling automobiles is to be erected by the Ford Motor Co. on Laurier avenue, near DeGaspe street, Montreal, Que. The permit was taken out at the City Hall today. The building is to be 150 feet long, 160 feet deep, and four stories, or 58 feet high.

Ford Buys Cleveland Land—The Ford Motor Co. has purchased 2½ acres of land in Cleveland, O., costing $90,000. According to tentative plans, the company will erect a building, six stories high, 150 feet wide and 600 feet long, with an elevated sidetrack entering at the second floor. A storage and distributing plant to care for the cars assembled will occupy part of the structure.

Fauber Proposes New Elgin Plant—W. H. Fauber, who was one of the original automobile manufacturers of America, and who made 100 machines in Elgin, Ill., and abandoned the field through lack of capital, has come forward with a proposition to establish another factory in that city. If his plans for a factory in that city go through he will manufacture a delivery car which he calls the Fauber Bi-Car.

Delaunty May Locate in Kenosha—The Delaunty Engine Co., Chicago, Ill., recently organized to build an improved type of gasoline motor for motor car and truck purposes, has opened negotiations with the Industrial Assn. of Kenosha, Wis., with a view to establishing its plant in that city. The concern is headed by Guy Guernsey, of Joliet, Ill., who is best known as president of the Hamilton Club of Chicago, and has splendid financial support.

The Automobile Calendar

May 2-9	Philadelphia, Pa., Cyclecar Show, Hotel Majestic.
May 2-27	Tulsa, Okla., Ozark Trails Good Roads Convention.
May 9	Atlanta, Ga., Third Annual Hill Climb, Atlanta Auto & Accessory Assn.
May 12	New York City, S. A. E., Ball and Roller Bearings Division Meeting.
May 14	New York City, S. A. E., Motor Testing Division Meeting.
May 19-20	Boston, Mass., Convention of New England Section of Electric Vehicle Assn. America, Engineers Club.
May 22	New York City, E. V. A. A., New York Section, Consolidated Gas Co. Bldg.
May 23-24	New York City Dealer's Business Demonstration, Motor Dealers Contest Assn.
May 25-26	Palermo, Sicily, Targa Florio, 700-Mile Race.
May 27-28	Washington, D. C., National Trade Convention, American Mfgs.' Export Assn.
May 28-30	Chambersburg, Pa., Trys over Lincoln Way from Chambersburg to Pittsburgh, Chambersburg Motor Club.
May 30	Newark, N. J., Cyclecar Run, Newark Cyclecar Club.
May 30	Indianapolis, Ind., 500-Mile Race, Indianapolis Motor Speedway.
May 30-31	Boston, Mass., N. E. Cyclecar Assn., Run through Mass.
June 1	Palermo, Sicily, Coupe Florio, 279-Mile Race.
June 17-18	Fayette Co., Pa., Second Annual Hill Climb, National Pike.
June 18	Uniontown, Pa., Hill Climb, Auto Club of Fayette Co.
June 20	Milwaukee, Wis., Competition Run between Milwaukee Athletic Club and Milwaukee Automobile Club.
June 23-26	S. A. E. Summer Meeting, Cape May, N. J., Cape May Hotel.
June 24-26	Chicago, Ill., Seventh Annual Meeting of Nat. Gas Engine Assn.
June 27-July 4	A. A. A. Touring Week.
June 29-July 2	Chicago to Boston National A. A. A. Reliability Tour.
June 30	London, Eng., Fourth International Rubber and Allied Industries Congress.
July 3-4	Tacoma, Wash., Montamara Festo Races, Tacoma Speedway Assn.
July 4	[illegible] City, Iowa, 300-Mile Race, Sioux City Auto Club and Speedway Assn.
July 4	Lyons, France, French Grand Prix.
July 13-14	Seattle, Wash., Track Races, Seattle Speedway Assn.
July 25-26	Belgium Grand Prix Road Races.
Aug. 21-22	Chicago, Ill., Elgin Road Races, Chicago Automobile Club.
Aug. 23	Auvergne, France, Coupe de l'Auto Race.
Sept. 9	Corona, Cal., Road Race, Corona Auto Assn.
Sept. 26-Oct. 6	Berlin, Germany, Automobile Show.
Oct.	Philadelphia, Pa., E. V. A. A. Annual Convention.
Oct. 9-Nov. 2	S. A. E. Europe Trip.
Oct. 17-24	Pittsburgh, Pa., Automobile Show, Auto Dealers Assn., Inc.
Oct. 19-26	Atlanta, Ga., American Road Congress of the American Highway Assn. and the A. A. A.
Oct. 28-31	Milwaukee, Wis., Convention, Northwestern Road Congress, Auditorium.

Lipman Organizes New Co.—Carl E. Lipman, Beloit, Wis., inventor of numerous air compressors and compressed air appliances, including pumps for motor cars, has organized the Lipman Air Appliance Co., capital stock $100,000, to specialize in the production of motor car devices. The manufacture has been conducted by the Lipman Mfg. Co. up to this time. The incorporators of the new company are Carl E., Ernst and E. K. Lipman. The factory facilities will be increased at once.

Carson-Rowell's New Plant—The Carson-Rowell Co., Appleton, Wis., manufacturing babbitt metal for bearings and other purposes, has started work on the construction of a new plant, which will enable the concern to produce about three times the tonnage of the past. The new factory has dimensions of 66 by 90 feet and is two stories high, with a large basement. The equipment includes twelve large furnaces, with a combined capacity of 5,000,000 pounds of babbitt metal annually.

Hartford Tire Pump Co. Producing—The Hartford Tire Pump Co., incorporated by W. Heston Knickerbocker, of Hartford, Wis., several weeks ago with $10,000 capital, has commenced the production of air-compressing appliances for motor cars. Mr. Knickerbocker has been developing the device for three years and is now ready to market the pump. The device is direct-driven by the motor and is claimed to have the unusual advantage which permits no gaseous substance to enter the tire or pressure tank. The factory is occupying the entire second floor of the Wittig garage at Hartford for the present and it is intended to erect a factory as soon as the demand warrants the proceeding.

Falcon Cyclecar Factory Doings—With the first series of demonstrators well under way and equipment and materials in readiness for stock car production on a scale of fifty a week, the Falcon Cyclecar Co. is rapidly extending its facilities in its new factory in Staunton, Va. The plant consists of two buildings located on the main line of the Chesapeake & Ohio, with a private siding. The smaller building, with 3,600 square feet of floor space, is equipped as a machine shop and tool room. The larger building, of four stories, gives 36,400 square feet of space for assembly, painting and shipping. Temporary offices are located in this building, pending the erection of a suitable office building. These buildings give ample space for the storage of materials and the production of over 5,000 cars per year, although the output of the company for the next 12 months will be limited to 2,500, for which contracts are now being issued. It is stated by this company that following the exhaustive tests given to their first model, plans have been completed for a fully standardized production, including de-

(*Continued on page* 995)

The Week in the Industry

Motor Men in New Roles

MEIGS Resigns—M. C. Meigs, for years advertising manager of the J. I. Case Threshing Machine Co., Racine, Wis., has resigned his position, effective May 15, to join the advertising department of the Chicago Examiner. He is succeeded as advertising manager of the Case company by D. M. Pettit, who assumes his new duties the middle of the month.

Schreiber in Detroit—O. A. Schreiber, for several years connected with the sales work of Abbott cars, has been transferred to Detroit as special representative of the Abbott Motor Car Co.

Gardner Heads Stewart-Warner Station—A new Stewart-Warner service station has been established at Atlantic City, N. J., 1703 Atlantic avenue, to be under the management of Wm. A. Gardner.

Acklin Heads Detroit Office—The Acklin Stamping Co., Toledo, has opened a Detroit office at 929 Ford building, with W. C. Acklin, secretary of the company in charge. The concern makes metal stampings for automobiles.

Pachman Heads General Motors—C. M. Pachman recently took active charge of the St. Louis, Mo., branch of the General Motors Truck Co. He was formerly Kansas City manager of the Kelly-Springfield Motor Truck Co.

Dawson Now a Mogul Agent—Frank Dawson, factory manager of the Mogul Motor Truck Co., St. Louis, Mo., has signed a contract with the Pacific Mogul Co. to handle the company's product on the Pacific coast. The company will have headquarters at San Francisco, Cal.

Prof. Christie Resigns—Prof. Alexander Christie, associate professor of steam and gas engineering at the University of Wisconsin, has resigned, effective July 1, to become associate professor of mechanical engineering at Johns Hopkins University, Baltimore, Md.

Shomo Willis Sales Manager—H. A. Shomo has been appointed sales manager of the automobile department of the Willis Co., 85 Chambers street, New York City, which recently became the selling agents for the Scripps-Booth, Mercury and the Imp Cyclecars.

Fried with Ferro Machine—E. R. Fried, formerly engineer with the General Motors Co., Detroit, Mich., and having a great deal to do with the research work which the General Motors Co. formerly carried on, has taken an engineering position with the Ferro Machine and Foundry Co., Cleveland, O.

Hopper with Remy—J. D. Hopper, formerly with the Hamilton Scale Co., Hamilton, O., has become affiliated with the service department of the Remy Electric Co., Anderson, Ind., J. L. Elwood having resigned to take a position with the Eureka Mfg. Co., North East, Pa., as general superintendent.

Springfield Body Opens N. Y. Showrooms—Henry Goodman, who has been in charge of the New York office of the Springfield Metal Body Co., Springfield, Mass., since it was established in January last, has opened a showroom at Broadway and 55th street. The various types of bodies will be placed on view.

Everitt Vice-President—B. F. Everitt, well-known automobile man, has entered the Sievers & Erdman Co., Detroit, Mich., as vice-president. Mr. Everitt will have the general management of the painting and trimming department, which has just been added to the plant, which has heretofore confined itself to special body work.

N. Y. Jeffery Branch Dissolved—The Jeffery business in New York City having been transferred from the company's branch to the Stratton M. C. Co., 1797 Broadway, the branch corporation, the T. B. Jeffery Co. of New York, is to be dissolved. A meeting of the board of directors for this purpose will be held May 18.

Jacoby Out of Buffalo Foundry—The Buffalo Foundry & Machine Co., of Buffalo, N. Y., announces that it has terminated the arrangement whereby H. E. Jacoby has been representing it in New York City and vicinity. It is now handling direct all inquiries covering vacuum apparatus, castings, patterns and machine work.

Maclellan Promoted—H. W. Maclellan, who has been Troy, N. Y., district manager for the E. V. Stratton Co., has been promoted to sales manager of the company with headquarters at Albany, and will have direct charge of the retail sales of the company, including its branches. Herbert E. Listman, of the Franklin agency, has succeeded Mr. Maclellan in Troy.

Holton Goes to Canada—Hoover Holton, who has been long prominent in the sales work of the Empire Automobile Co. of Indianapolis, has been appointed Canadian sales manager of the Empire, and will devote himself to further development of the Empire sales, and distribution in Canada, operating from the offices of the Empire Automobile Sales Co. of Canada with headquarters at London, Ont.

Carris in West for Franklin—C. S. Carris, district sales manager for the Franklin Automobile Co. in the Atlantic district, has been appointed district sales manager for the Middle West. He will make his headquarters at Kansas City and his territory will comprise the following states: Montana, North Dakota, South Dakota, Colorado, Oklahoma, Kansas, Arkansas, Nebraska, Wyoming, New Mexico and Missouri.

Vallat Joins Dominion Co.—B. W. Vallat has been chosen vice-president of the Dominion Stamping Co. at Ford City, Ont. The concern is a subsidiary of the Michigan Stamping Co., Detroit, which specializes in aluminum and sheet metal stamping and drop forgings for automobile companies. Extensive additions are to be made to the Ford City plant to take care of the Dominion Co.'s rapidly increasing business. Mr. Vallat was formerly superintendent of the Newport Mining Co., Ironwood, Mich.

Hudson Gets Truck Job—George Hudson, manager of the New England branch of the American Locomotive Co., has been made manager of the new gasoline branch of the General Vehicle Co. to handle the Mercedes truck. Day Baker retains the managership of the General Vehicle electric trucks department. The headquarters have been moved from 84 State street, Boston, to the Shoe and Leather Exchange building in Cambridge.

—

Garage and Dealers' Field

U. S. L. N. Y. Offices Moved.—The general offices of the United States Light & Heating Co., at 30 Church street, New York City, will be moved on May 20 and located thereafter at the company's plant, Niagara Falls, N. Y.

Woods Electric Opens Showroom—The Woods Motor Vehicle Co., Chicago, Ill., has opened a new downtown showroom at Michigan avenue and Peck Court, Chicago, Ill.

Maxwell's Newspaper—The Maxwell Motor Co., Detroit, Mich., recently published the first issue of the "Maxwell Factory and Dealers' News," for the purpose of getting in closer touch with its dealers and promoting Maxwell sales.

Bosch-Equipt Sunbeam Record—The 12-cylinder Sunbeam car which covered the half mile on March 18 last at Brooklands in 15.03 seconds, an average of 119.6 miles per hour, and which covered the mile in 29.82 seconds, an average speed of 120.73 miles per hour, was equipped with a Bosch ZU6 magneto.

Dealers' Association Declares Dividend—The Des Moines Automobile Dealers' Association recently declared a 60 per cent. dividend of all the receipts of the 1914 auto show, which was held in March, and which attracted a total attendance of 30,000 people. It was voted to hold another show in 1915. Dean Schooler and C. G. Van Vliet were re-elected as president and secretary, respectively.

Motz Tire's New Agents—The Motz Tire & Rubber Co., Akron, O., established during the month of March three new distributing centers in the Central West. The Electric Garage, of Fort Wayne, Ind., and the South Bend Rubber Co., South Bend, Ind., were added to the company's representation in Indiana; Gietl Brothers are now distributors of Motz tires in the territory adjacent to Springfield, Ill.

An Automobile Bus Line—The Shenandoah Valley Transportation Co., Strasburg and Winchester, Va., proposes to conduct an automobile passenger business between the two points, a distance of 18 miles, operating a twenty-passenger machine which will be lighted by electricity at night. The car will make two round trips daily. Connection with the Cumberland Valley Railroad will be made at Winchester. The service may be extended to Harpers Ferry, 22 miles from Winchester. H. C. Barden, M. O. Simpson and F. W. Shank are interested.

Automobile Agencies Recently Established

PASSENGER CARS

Place	Car	Agent
Ada, Minn	Maxwell	Norman Co. Auto Co.
Alma, Neb	Hupmobile	W. B. Ralston
Amory, Miss	Maxwell	Arch Dairymple
Appleton, Wis	Maxwell	F. Wright Auto Co.
Arapahoe, Neb	Maxwell	A. Benjamin
Argyle, Minn	Maxwell	F. J. Schreck
Aurora, Mo	Packard	T. E. McClure
Avon, Ill	Hupmobile	A. E. Glaser
Avon, S. D	Hupmobile	Wm. Moersfelder
Baltimore, Md	Abbott-Detr.	Roland Park Gar.
Baltimore, Md	Oldsmobile	Auto Sales Co.
Bardstown, Ky	Saxon	Grigsby & Co.
Bardstown, Ky	Cole	Grigsby & Co
Batesville, Ind	Maxwell	Pohlar Auto Co.
Battleford, Sask	Hupmobile	Jack Martin
Beaufort, Mo	Metz	L. Hemminghaus
Beaver Cros'g, Neb.	Maxwell	Watts & Owens
Bedford, Pa	Hupmobile	Milton Sammel
Berkshire, N. Y	Hupmobile	P. H. Mayor
Bladen, Neb	Hupmobile	F. S. Kudrna
Bluffton, O	Maxwell	H. Basinger
Booneville, Mo	Packard	O. H. Stephens
Bradford, Ill	Hupmobile	W. W. Jones
Britton, S. D	Hupmobile	H. C. Fricke
Broken Bow, Neb	Paige	G. Ream
Brookings, S. D	Maxwell	F. C. Fryer
Brownwood, Tex	Maxwell	Bouldin & Wheeler
Brunson, S. C	Maxwell	D. F. Moore, Jr.
Brunswick, Mo	Packard	Halliburton Bros. Gar.
California, Mo	Packard	H. & W. Kuhlmanns
Campbellsport, Wis.	Maxwell	Campbellsport Imp. Co.
Caney, Kan	Maxwell	Todd Hdwe. & Sup. Co.
Canton, Ill	Hupmobile	J. Jolly
Carbondale, Col	Maxwell	W. M. Dinkle M.& L. Co.
Carrollton, Ky	Reo	S. C. Jacobs
Carrollton, Mo	Packard	Wright Bros.
Chapman, Ill	Metz	Spears & Sons
Chatham, N. Y	Maxwell	J. W. Darrows
Chester, Ill	Metz	Huebach Bros.
Chico, Cal	Maxwell	W. J. Bowman
Clark, S. D	Hupmobile	F. Mahan.
Clark, S. D	Hupmobile	Floyd Mahan
Clatonia, Neb	Maxwell	H. L. Lohmeyer
Clinton, Mo	Packard	Industrial Iron Wks.
Clio, Ala	Maxwell	Wallace & Strickland
Coaticook, Que	Maxwell	Chesley & Hull
Coldwater, Mich	Maxwell	McNaughton & Warner Co.
Columbia, Mo	Maxwell	F. W. Neidermeyer
Columbia, Mo	Metz	J. N. Taylor
Columbus, Neb	Paige	J. Luxa
Columbus, O	Crow-Elkhart	F. Mayer
Colwood, Mich	Hupmobile	C. D. Andrews
Concord, N. H	Maxwell	West End Gar.
Corydon, Ky	Cole	R. D. King
Corydon, Ind	Cole	V. H. Bulleit & Son
Coshocton, O	Buick	William Layman
Crawford, Neb	Maxwell	J. J. Adams, Jr.
Danbury, Ia	Maxwell	Fred Kann
Davenport, Ia	Maxwell	G. H. Knowles
Decatur, Ill	Maxwell	Dawson Auto Co.
Delavan, Ill	Hupmobile	Warren Ronner
Dodge, Ia	Paige	E. Kubuck
Duke Center, Pa	Hupmobile	L. J. Lilly
East End, Sask	Hupmobile	Crawford & Jones
East St. Louis, Ill	Haynes	Seifart Auto Co.
Eclipse, Neb	Hupmobile	J. J. Gragg
Edina, Mo	Hupmobile	Johnston Bros.
Eldorado Spgs., Mo.	Packard	C. M. Mason Auto Co.
Elmwood, Neb	Hupmobile	O.M. Ward
Embden, N. D	Maxwell	C. J. Buck
Emporia, Kan	Packard	Newton Bros.
Esparto, Cal	Maxwell	Esparto Gar. Co.
Eustis, Neb	Maxwell	J. L. Easterday
Excelsior Spgs., Mo.	Packard	Elms Gar. & Auto Co.
Fairmont, W. Va	Oakland	Harry Shaw
Farmington, Mo	Chandler	P. Giessing
Farmville, Va	Maxwell	Farmville Mfg. Co.
Fort Pierre, S. D	Maxwell	Wm. Hayes
Frankfort, Ky	Reo	G. M. Gayle
Franklin, Pa	Oakland	John Nadig
Friend, Neb	Hupmobile	William Vossler
Gardner, Mass	Maxwell	L. H. Parcher
Garnett, Kan	Packard	Garnett Gar.
Geddes, S. D	Hupmobile	W. H. Fowler
Geronimo, Tex	Maxwell	Alfred Koebig
Glasgow, Ky	Saxon	L. E. Botts
Golconda, Ill	Maxwell	W. S. & C. Motor Co.
Graham, Cal	Maxwell	E. L. Zimmerman
Gravity, Ia	Chandler	Clyde Wilson
Greenfield, Mo	Packard	J. E. Shaw
Halifax, N. S	Maxwell	C. L. Newman, Ltd.
Hancock, N. Y	Maxwell	Bell & Taylor
Hankison, N. D	Hupmobile	Fred Krause
Harrisburg, S. D	Hupmobile	T. Dempewolf
Hartford, Conn	Haynes	New England Gar. Co.
Hartford, Conn	Standard	E. S. Clark
Haton, N. M	Maxwell	G. D. Siemantel
Hayesville, Ia	Maxwell	R. R. Jacobs
Hiawatha, Kan	Packard	M. & K. Auto Co.
Higginsville, Mo	Packard	G. & R. Motor Co.
Holdredge, Neb	Maxwell	Western M. C. Co.
Holton, Kan	Packard	Holton Auto Co.
Hopkinsville, Ky	Cadillac	Cadillac Auto Co.
Horse Cave, Ky	Reo	C. D. Branstetter
Huntsville, Mo	Metz	W. J. Day
Ida Grove, Ia	Maxwell	Julius Sauer
Imperial, Neb	Maxwell	J. A. Hay
Independence, Kan.	Packard	J. F. Daniels
Iola, Kan	Packard	J. B. Kirk
Jackson, O	Maxwell	McCoy Bros.
Jamestown, Kan	Hudson	Enless & McCall
Jefferson, O	Maxwell	A. F. Sikes
Johnston City, Ill	Moon	L. Peterson
Kansas City, Mo	Hudson	Hudson-Brace Motor Co.
Kansas City, Mo	Interstate	Mo. & Kan. Auto Co.
Kansas City, Mo	Krit	H. F. Sundin
Kansas City, Mo	Lewis	Young Motor Co.
Kansas City, Mo.	Partin-Palm	Stancliffe Sales Co.
Keokuk, Ia	Chandler	J. S. Bullock
Kirksville, Mo	Packard	Carder Auto Co.
Lamar, Mo	Packard	Pacific Gar.
Lewistown, Mo	Hupmobile	Daniel Turpin
Lawrence, Mass	Maxwell	E. C. Merrill
Lamberton, Minn.	Maxwell	F. H. Retzlaff
Lexington, Mo	Packard	Santa Fe Trail Gar.
Linneus, Mo	Packard	Biddle & Mace
Linton, Ind	Maxwell	Beasley Auto & Sup. Co.
Litchfield, Ill	Chandler	G. E. Brubaker
Litchville, N. D	Maxwell	Hanson & Holte
Louisville, Ky	Franklin	Younger Auto Co.
Magog, Que	Maxwell	W. T. Peters
Manito, Ill	Hupmobile	D. D. Zimmerman
Mapleton, Minn	Maxwell	Borchert Bros.
Marion, Ill	Hupmobile	B. Spitznass
Marshall, Mo	Packard	C. H. Rea Imp. Co.
Maryville, Kan	Packard	Independent Gar. Co.
Maynard, Mass	Maxwell	J. A. Coughlan
Menno, S. D	Hupmobile	Ed. Decker
Merriman, Neb	Hupmobile	Metzger Bros.
Mexico, Mo	Metz	Gallagher & Co.
Millstadt, Ill	Metz	Aug. Dietrick
Milnor, N. D	Maxwell	J. K. Taylor
Minneapolis, Minn.	Crow-Elk	Curtis & Johnson
Minneapolis, Minn.	Lewis	Curtis & Johnson
Minneapolis, Minn.	Westcott	N. W. Haynes Auto Co.
Moberly, Mo	Maxwell	L. P. Hoffman
Moberly, Mo	Packard	Goddard White Co
Mondamin, Ia	Hupmobile	G. W. Coffman
Monmouth, Ill	Hupmobile	G. L. Deffenbaugh
Montgomery, Ala	Maxwell	L. J. Pake
Mt. Hope, W. Va	Haynes	Tully Haynes Auto Co.
Mt. Morris, Ill	Maxwell	A. E. Clevidence
Mt. Vernon, Ill	Oakland	Threlkels Bros
Mt. Vernon, O	Saxon	H. C. Plimpton
Neosha, Mo	Packard	Rudy Land & Invest. Co.
Nevada, Mo	Packard	Nevada Auto & Elec. Co.
New Leipzig, N. D.	Maxwell	Val Horner
New London, Conn.	Maxwell	Palmer's Gar.
New Orleans, La	Moon	Moon Agency
Newport, Wash	Metz	J. G. Flynn
New Albany, Ind	Ford	Borgerding M. C. Co.
New Albany, Ind	Saxon	W.W. Humbert
Nixon, Tex	Hupmobile	W. M. McGee
Norwalk, O	Ford	E. E. Sly
Nortonville, Kan	Hudson	H. E. Burdick
Oblong, Ill	Regal	Newlin Gar.
Oblong, Ill	Regal	B. Mewland
Old Monroe, Mo	Hupmobile	Henry Wehdo, Jr.
Omaha, Neb	Haynes	Haynes Auto Sales Co
Onida, S. D	Maxwell	Johnson & Haverly
Ontario, Cal	Maxwell	F. A. Saunders
Ormsby, Minn	Hupmobile	Shellum & Duskinsky
Ottawa, Que	Hudson	International Motor Co.
Ottawa, Que	Mitchell	Ottawa Taxi & Auto Co.
Ottawa, Que	Oakland	Plaza Gar.
Paducah, Ky	Regal	R. S. Graham
Panama, Ia	Hupmobile	C. Manhart
Paola, Kan	Packard	Lohr & Gardiner
Paris, Ky	Haynes	Craig-Davis Motor Co.
Pensacola, Fla	Maxwell	J. E. Nicholas
Plainwell, Mich	Maxwell	Ingraham & Travis
Pleasureville, Ky	Saxon	R. O. Bryant
Polo, Mo	Maxwell	C. C. Bland, Jr.
Provo, Utah	Maxwell	Dell Chipman
Rhineland, Tex	Maxwell	Peter Lorenz
Rialto, Cal	Maxwell	J. M. Bradford
Richmond, Mo	Packard	T. B. Blount Gar.
Roodhouse, Ill	Metz	B. B. Lang
Rushmore, Minn	Maxwell	F. G. Herman
Salt Lake City, Utah,	Haynes	A. F. Sacage
Santa Barbara, Cal.	Saxon	El Canino Real M. C. Co.
Sedalia, Mo	Packard	Paul McAninch
Sedan, Kan	Hudson	Wall Auto Co.
Shelbyville, Ky	Saxon	E. B. Graham
Shinglehouse, Pa	Maxwell	Grand Central Gar.
Sidney, Neb	Maxwell	Livoni & Son
South Bend, Ind	Cole	M. L. Williams
Springfield, Ill	Chandler	Van Duyn & Mathis
Springfield, O	Herff-Brooks.	Jordan Motor Sales Co.
Stark, Ill	Hupmobile	E. C. Jackson
Stamps, Ark	Maxwell	Sanders & Purser
Stockton, Cal	Maxwell	Stockton Gar.
St. James, Minn	Maxwell	F. H. Klaras
St. Louis, Mo	Stanley	Stanley Motor Co.
Sturgis, S. D	Maxwell	M. R. Dobbins
Syracuse, Neb	Hupmobile	Jas. Fairhead
Taylorville, Ill	Maxwell	W. B. Wood
Taylorville, Ill	Metz	Louis Seelbach
Tonasket, Wash	Metz	A. G. Nichols
Trinidad, Col	Maxwell	Trinidad Gar. Co.
Trivoli, Ill	Maxwell	E. H. Kessler & Sons
Tulsa, Okla	Moon	Reo Motor Sales Co.
Waterbury, Neb	Maxwell	C. E. Armstrong
Waterloo, Ia	Westcott	Rader & Bates
Walthill, Neb	Hupmobile	G. M. Myers
Walton, N. Y	Maxwell	Munn & Parker
Water Valley, Miss.	Maxwell	W. R. Williams
Webster City, Ia	Moon	Parkhurst & Lavender
Woodsville, N. H	Maxwell	Burbeck & Young
Yale, Ill	Maxwell	J. L. Forester
York, Neb	Chandler	E. S. Clark

—

Recent Incorporations in the Automobile Field

AUTOMOBILES AND PARTS

ALEXANDRIA, VA.—Central Automobile Co.; capital, $5,000; automobiles. Incorporators: W. H. Heymel, J. A. Egghorn.

BOWLING GREEN, KY.—Imperial Auto Co.; capital, $8,000; to deal in automobiles. Incorporators: J. B. Lucas, J. W. Massey, J. M. Lovell, G. D. Vance.

BROOKLYN, N. Y.—C. W. Church Service Co.; capital, $5,000; to deal in automobiles. Incorporators: A. A. Volk, C. W. Church, G. V. Mulligan.

BROOKLYN, N. Y.—The British Automobile Co.; capital, $1,000. Incorporators: Roscoe Humphrey, Louisa Feather, Tom Feather.

BRYAN, O.—Bryan Automobile Co.; capital, $1,000; to deal in automobiles. Incorporators: O. W. Gleason, E. D. Spangler, J. H. Roe, W. T. Gardner, H. W. Gardner.

BUFFALO, N. Y.—Geo. Schmitz & Bro.; capital, $5,000; to manufacture automobile bodies. Incorporators: Elizabeth Schmitz, John G. Schmitz, Geo. Schmitz.

CHICAGO, ILL.—Graham Automobile Co.; capital, $2,500; automobiles. Incorporators: C. E. Graham, A. S. Robertson, N. J. Shupe.

CHICAGO, ILL.—Bay Field Cyclecar Co.; capital, $5,000. Incorporators: Geo. Elvers, A. G. Henning, E. H. Benzing.

CHICAGO, ILL.—Ropp Motor Co.; capital, $2,500. Incorporators: Edward Ropp, Gertrude Ropp, Geo. Quinn.

CLEVELAND, O.—Cleveland Cyclecar Co.; capital, $200,000; to manufacture and sell cyclecars and automobiles. Incorporators: William N. Noyes, Robert Clarke, Frank H. Schmidt, W. M. Burns, Chas. Savage.

CLEVELAND, O.—Sixth City Motors Co.; capital, $10,000; general automobile business. Incorporators: E. E. Ledogas, B. R. Tewsbury, L. M. Uhl, R. S. Andrews, L. S. Douglass.

CLEVELAND, O.—Swan Demountable Body Co.; capital, $25,000; to make bodies and tops for automobiles. Incorporators: Thomas Swan, Robert G. Nierman, Geo. Selick, William Lutey, A. Gibbons.

COLUMBUS, O.—Armstrong-Johnston Mfg. Co.; to deal in automobiles and supplies. Incorporators: M. Armstrong, W. R. Johnston, J. D. Loomis, J. H. Johnston, J. G. Obermeyer.

COLUMBUS, O.—Electric Auto Sales & Service Co.; capital, $5,000; to deal in automobiles. Incorporators: H. Eckhart, M. E. Born, E. L. Taylor, Jr., C. C. Williams, H. Eckhart, Jr.

DALLAS, TEX.—Dallas Motor Bus Co.; capital, $25,000; automobile bus line. Incorporators: R. Robertson, D. E. Taylor, W. M. Smith.

DAYTON, O.—Dayton Auto Trades Assn.; to promote interests of automobile and accessories dealers in Dayton. Incorporators: E. C. Kinney and others.

DETROIT, MICH.—Cricket Cyclecar Co.; capital, $400,000. Incorporators: G. F. Burton, V. F. Dewey, K. B. White, W. L. Davis, A. R. Demory.

KANSAS CITY, MO.—Hall Bros. & Reeves Motor Co.; capital, $5,000; automobiles. Incorporators: C. W. and A. H. Hall, C. H. Thompson.

KANSAS CITY, MO.—Saxon Kansas City Motor Co.; capital, $3,000. Incorporators: L. T. Shelton, C. A. Forster, H. B. Smith.

LEXINGTON, KY.—Lexington Moon Auto Co.; capital, $8,000; to deal in automobiles. Incorporators: B. B. Reed, E. H. Reed, Bat McCann.

MANSFIELD, O.—Flexible Side Car Co.; capital, $25,000. Incorporator: Carl F. Dudte.

NEWARK, N. J.—Walsh Auto Service Co.; capital, $25,000; to deal in automobiles. Incorporators: F. H. Walsh, H. D. Brangwin, S. P. Watson.

NEW YORK CITY—Chalmers Motor Co.; capital, $50,000; to deal in automobiles. Incorporators: Hugh Chalmers, C. A. Pfeffer, George Stowe.

NEW YORK CITY—Goodell & Co.; capital, $10,000; to deal in automobiles. Incorporators: R. D. Goodell, F. P. Hudson, W. E. Osterhout.

NEW YORK CITY—Reo M. C. Co.; capital, $3,000; to deal in automobiles. Incorporators: J. H. Shaw, R. H. Montgomery, W. M. Lybrand.

NEW YORK CITY—Star Auto Exchange; capital, $5,000; to deal in automobiles. Incorporators: Sadye Schulman, H. Selnik, M. Weiner.

NEW YORK, N. Y.—Euclid Motor Car Co.; capital, $250,000. Incorporators: Emil F. Kalkhof, M. K. Cowie, Howard Plowman.

NEW YORK, N. Y.—Holden One Man Top Co.; capital, $25,000; to sell automobile tops. Incorporators: N. Holden, Samuel Nehtzoff, C. K. Pacht.

NEW YORK, N. Y.—Joseph Huber, Inc.; capital, $10,000; motor vehicles, cars. Incorporators; Thomas Doyle, P. Huber, Jos. Huber.

NORFOLK, VA.—Norfolk Auto Service Co.; capital, $25,000; to deal in automobiles. Incorporators: R. S. Douglass, D. Hardy.

PULASKI, VA.—Pulaski M. C. Co.; capital, $25,000; to deal in automobiles. Incorporators: J. W. Eckman and others.

RICHMOND, VA.—Shenandoah Motor Sales Co.; automobiles. Incorporators: S. S. Brooks, S. P. Sanders.

RICHMOND, VA.—Szekely Cyclecar Co.; capital, $50,000; cyclecars. Incorporators: H. F. Bernhard, E. J. Bernhard.

RICHMOND, VA.—Autocar Sales Corp.; capital, $25,000. Incorporators: James Pennington, Richard Burroughs.

RICHMOND, VA.—Cyclecar Sales Co.; capital, $25,000; to do a general automobile business. Incorporators: Geo. DeHegh, Bertram Singer, Eugene L. DeHugh.

RICHMOND, VA.—Motor Service Corp.; capital, $25,000. Incorporators: John H. Farmer, L. S. Brenner, T. G. Burch.

ROCHESTER, N. Y.—Alderman Mfg. Co.; capital, $5,000; to manufacture and deal in automobile ac-

cessories. Incorporators: Arthur W. Alderman, Chas. L. Pierce, W. Hazard.

SANDUSKY, O.—Dauch Mfg. Co.; capital, $800,000; to manufacture motor trucks of all kinds. Incorporators: Mr. J. J. Dauch, Daniel Storms, R. D. Mitchell, Chas. Dick.

SPRINGFIELD, MASS.—Beacon Motor Supply Co.; capital, $10,000; to deal in automobiles. Incorporators: J. B. Belford, L. G. Carlton, C. F. Munn.

SPRINGFIELD, MO.—Hayward Wrench Co.; capital, $100,000; to manufacture and sell automatic automobile wrenches. Incorporators: Robert H. Hayward, Homar Hayward, Lewis T. Duncan.

TOLEDO, O.—The H. E. Throne Automobile Co., capital, $30,000; to deal in automobiles. Incorporators: Mr. H. E. Throne, F. C. Schael, G. C. Bradley, C. J. Clapp, W. H. Schroeder.

YOUNGSTOWN, O.—The Car Nation Auto Sales Co.; capital, $10,000; to deal in automobiles. Incorporators: Morris H. Squire, B. O. Shulman, A. Kessler, Louis J. Shuman, A. Cassano.

YOUNGSTOWN, O.—Carnation Auto Sales Co.; capital, $10,000; to sell cars. Incorporators: Morris H. Squires, B. O. Schulman, A. Kessler, Isaac Wikoff, Louis Schulman.

GARAGES AND ACCESSORIES

ALBION, N. Y.—Albion Garage, Inc., capital, $6,000. Incorporators: A. J. Peterson, Chas. Burbank, Roy Crandall.

APPLETON, WIS.—Wishoma Oil Co.; capital, $6,000; to produce and refine petroleum and petroleum products. Incorporators: H. K. Pratt, Julius Bonini and others.

BROOKLYN, N. Y.—Blue Ribbon Auto Renting Co.; capital, $2,000; to rent automobiles. Incorporators: Sadie Garfinkel, F. Wiener, Morris Weintraub.

BROOKLYN, N. Y.—Trautwein Tire & Repair Co.; capital, $10,000; tire repairs. Incorporators: W. Trautwein, O. Trautwein, F. Trautwein.

BUFFALO, N. Y.—Automobile Accessories Co.; capital, $25,000; automobile accessories. Incorporators: T. R. Thomas, W. H. Linford, A. B. Floyd.

BUFFALO, N. Y.—Chilson Garage; capital, $3,000; general garage business. Incorporators: Carrie Nagle, Wm. Schutrum.

BUFFALO, N. Y.—Motor Radiator Corp.; capital, $50,000. Incorporators: Chas. H. Dippert, Ed. W. Werick, Wm. M. Causley.

CHICAGO, ILL.—South Side Auto Livery Co.; capital, $10,000; general automobile livery. Incorporators: C. L. Atwater, C. D. Atwater, J. A. Swanson.

CHICAGO, ILL.—City Motor Livery Co.; capital, $5,000. Incorporators: Lawrence McNeil, William Bartoch, A. Harrington.

CHICAGO, ILL.—Hardman Tire & Rubber Co.; capital, $10,000; to manufacture and deal in automobiles, accessories. Incorporators: Claude Beardsley, J. Jones, T. W. Tyrrell.

CLEVELAND, O.—Tacoma Auto Service Co.; capital, $10,000; general garage business. Incorporators: M. A. Copeland, F. B. Evartson, J. H. Mosel, C. Verbsky, B. M. Spooner.

CLEVELAND, O.—Brown Middlewest Tube Co.; capital, $10,000. Incorporators: Melvin O. Smith.

CLEVELAND, O.—Cleveland Sightseeing Co.; capital, $10,000; to operate motor-driven sightseeing cars. Incorporators: J. A. Nally, H. V. Nally, Kittie Neale, E. G. Nally, W. G. Kanin.

CLEVELAND, O.—Hartman Auto Transfer Co.; capital, $10,000; to do a general transfer business. Incorporators: John Nally, R. P. Snyder, Kittie Kneale, E. G. Nally, R. Nally.

CORTLAND, N. Y.—Thomas Carbon Remover Co.; capital, $10,000. Incorporators: Linden Thomas, Walter Letts, Grace Letts.

DAYTON, O.—Operative Automobile Supply Co.; capital, $5,000; automobile supplies. Incorporators: O. C. Noble, P. W. Tappan, E. E. McKnight, C. W. Gard, D. M. Hall.

DAYTON, O.—G. T. Foster Garage and Sales Co.; capital, $5,000; sales and garage business. Incorporators: G. T. Foster, Nellie Foster, R. L. Foster, C. N. Dale, S. G. Kusworm.

DAYTON, O.—Puncture Seal Manufacture Co.; capital, $25,000; automobile accessories. Incorporators: F. R. Miller, A. V. Miller, Walter McKnight, A. W. Strang, Clarence Hange.

DAYTON, O.—Bradley Electric Garage Co.; capital, $10,000; to deal in automobiles and do a garage business. Incorporators: Francis Bradley, Frank Blessing, L. E. Bradley, Albert Miller, T. M. Hiester.

DEPOSIT, N. Y.—Oquaga Garage Co.; capital, $5,000; general garage business. Incorporators: L. J. Kehr, F. N. Kehr, H. A. McMurray.

FULTON, N. Y.—West Side Motor Car & Supply Co.; capital, $2,000. Incorporators: R. B. Harrison, Ellen McGinnis, John J. McGinnis.

GLENS FALLS, N. Y.—Empire Gasoline Co.; capital, $5,000. Incorporators: Dan H. Cowles, F. M. Starbuck, Donald Hepburn.

GALESBURG, ILL.—Merchants Auto Delivery Co.; capital, $15,000; to operate a transportation, transfer and delivery business. Incorporators: W. A. Space, F. L. Mead, John Smith.

HUDSON, O.—Hudson Garage Co.; capital, $7,500; general garage business. Incorporators: T. E. Bissell, J. M. Beers, Clara Beers, Mabelle Bissell, F. N. Seward.

HUNTINGTON, N. Y.—Singer Motor Co.; capital, $175,000; autos and accessories. Incorporators: Chas. A. Singer, Chas. A. Singer, Jr., Harold Callisen.

IRONTON, O.—Auto Valve Co.; capital, $10,000; to manufacture and deal in valves for automobiles. Incorporators: Otto Ebert, A. M. Johnson, E. B. Newman, Dan Jones, C. B. Egerton.

LANCASTER, N. Y.—Stutzman-Goldbach Garage; capital, $10,000. Incorporators: Raymond Stutzman, Ella Stutzman, J. P. Goldbach.

LITTLE FALLS, N. Y.—Little Falls Gasoline & Oil Co.; capital, $5,000; to deal in gasoline, lubricating oils, etc. Incorporators: S. F. Jones, P. B. McCaghey.

LITTLE ROCK, ARK.—Lafferty-Smith Co.; capital, $100,000; to vulcanize tires. Incorporators: T. Lafferty, H. P. Smith, R. Lafferty.

NEWARK, N. J.—H. U. H. Tire Co.; capital, $5,000; automobile tires. Incorporators: S. Holzman, L. Unstaeder, R. Holzman.

NEW YORK CITY—Racine Rubber Tire Co.; capital, $3,000; tires. Incorporators: E. Storms, Jr., E. W. Drucker, Barclay Ball.

NEW YORK CITY—United Tire and Rubber Works; capital, $5,000; to deal in tires. Incorporators: J. J. O'Connor, Aram Saraydarian, Vincent Yardum.

NEW YORK CITY—Newman Tire & Rubber Co.; capital, $5,000; accessories. Incorporators: Stanley Newman, S. G. Newman, Arthur Newman.

NEW YORK CITY—William Krauss Garage; capital, $50,000; general garage business. Incorporators: V. K. Smith, A. R. Swan, F. W. Bisgood.

NEW YORK, N. Y.—Advance Tire Sales Co.; capital, $5,000. Incorporators: Grace A. Burnette, Geo. L. Lewis, Chas. H. Stanton.

NEW YORK, N. Y.—Yellow Taxicab Co.; capital, $500. Incorporators: H. J. Osborne, John C. Taylor, T. G. O'Brien.

NEW YORK, N. Y.—Hope Garage Co.; capital, $10,000. Incorporators: Wm. Buie, Elijah Dabney, Chas. W. Lewis.

NEW YORK, N. Y.—Morris Auto Safety Signal Co.; capital, $50,000; automobile supplies. Incorporators: Michael Morris, S. L. Keller, Camille Trillard.

NEW YORK, N. Y.—Bay Auto Renting Co.; capital, $5,000. Incorporators: Harry J. Benjamin, Alice Meyers, Wm. Meyers.

NEW YORK, N. Y.—United Anchor Tire Co.; capital, $2,000; automobile tires, etc. Incorporators: Robert Schlesinger, Frank H. Cross, Geo. Roots.

NEW YORK, N. Y.—Vrabeck Auto Supply Co.; capital, $5,000. Incorporators: E. S. Wolbarst, Chas. Podensick, Violet Turner.

NYACK, N. Y.—Rockland Auto Garage; capital, $25,000; general garage business. Incorporators: A. W. Field, O. F. Theis, H. A. Gross.

OKLAHOMA CITY, OKLA.—Skiatook Garage Co.; capital, $3,000. Incorporators: W. J. Shafer, C. L. Wall, L. E. Mason.

PLYMOUTH, WIS.—Deicher & Arndt Co.; capital, $50,000; to operate a garage and machine shop. Incorporator: Adam Deicher.

ROCHESTER, N. H.—Genesee Valley Equipment Co.; capital, $5,000; automobile supplies. Incorporators: U. J. Winkert, R. T. Gallagher, C. F. Boyd.

ST. LOUIS, MO.—Aulogo Motor Cap Co.; capital, $25,000; automobile accessories. Incorporators: J. A. Cohoun, J. F. Hilbert, T. H. Thatcher.

ST. LOUIS, MO.—Finaline Mfg. Co.; capital, $20,000; to manufacture varnish and finisher. Incorporators: T. W. Carter, D. Morische, E. L. Foth.

ST. LOUIS, MO.—Fowler Motor Thermometer Co.; to manufacture and sell automobile thermometers to register motor temperature. Incorporators: F. E. Fowler, Jr., F. W. Fowler, Sr.

ST. LOUIS, MO.—Reliable Auto Tire Co.; capital, $3,000. Incorporators: J. Sacks, Louis Wyner, B. Sacks.

TWO RIVERS, WIS.—The Kahlenberg-Klaus Co.; capital, $25,000; to manufacture internal combustion engines and conduct experimental work. Incorporators: Louis Kahlenberg.

UTICA, N. Y.—D. & M. Auto Supply Co.; capital, $25,000; automobile accessories. Incorporators: Isaac Denovsky, Ida Denovsky, S. Mailman.

WASHINGTON, D. C.—Congressional Garage Co.; capital, $75,000; general garage business. Incorporators: C. W. Semes, G. Semes.

WELLESLEY, MASS.—Lower Falls Garage Co.; capital, $5,000; general garage business. Incorporators: N. J. McGaffin, G. R. Williams.

WILMINGTON, DEL.—Consumers Gasoline Supply Co.; capital, $250,000; to deal in gasoline. Incorporators: William Boyd, W. I. N. Lofland, W. F. P. Lofland.

WILMINGTON, DEL.—Sanitary Sales Co.; capital, $5,000; to build, construct and operate motor vehicles, engines, etc. Incorporators: H. E. Latter, W. J. Maloney.

CHANGES OF NAME AND CAPITAL

CHICAGO, ILL.—Auto Parts Co.; capital increased from $200,000 to $1,000,000.

CHICAGO, ILL.—Sandow Truck Co.; capital increased from $5,000 to $200,000.

CHICAGO, ILL.—Atkins Carbureter Co.; capital, increased from $2,500 to $32,500.

CLEVELAND, O.—Deferest Electric Welding Co.; change of name to the Lake Erie Electric Welding Co.

CLEVELAND, O.—Motor Supply & Tire Co.; capital increased from $1,000 to $50,000.

CLEVELAND, O.—Cleveland Automobile Club; capital increased from $10,000 to $30,000.

CLEVELAND, O.—Cuyahoga Spring Co.; capital increased from $20,000 to $30,000.

COLUMBUS, O.—John W. Brown Mfg. Co.; capital increased from $370,000 to $400,000.

ELYRIA, O.—Dean Electric Co.; capital reduced from $665,000 to $131,000.

LAPORTE, IND.—Walker Starter Co.; capital increased from $30,000 to $50,000.

LEXINGTON, KY.—Commercial Auto Car Co.; capital increased from $12,000 to $25,000.

OKLAHOMA CITY, OKLA.—Buick Motor Co.; capital increased from $2,000 to $12,500.

RICHMOND, VA.—Autocar Sales Corp.; change of name to the Commercial Car Corp.

TOLEDO, O.—Bossell Motor Co.; capital increased from $400,000 to $35,000.

Factory Miscellany—Continued

signing a number of novel tools which materially shorten the process of making several of the Falcon features.

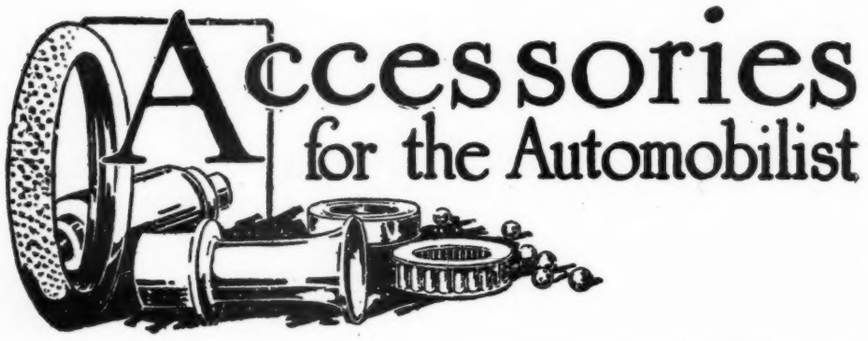
Automobile Plant Burned—Fire which started in the plant and oil storage room of the Illinois Automobile Co., Galesburg, Ill., completely destroyed the $25,000 plant with all its contents.

Cole Factory Dedicated—The new factory of the Cole Motor Car Co., in Indianapolis, was dedicated on April 15. The Cole company is sending out invitations to dealers and their friends and owners of Cole cars to visit this plant during the Decoration Day 500-mile race. "The Sun Shines Bright in Indiana" meeting will be held either the day previous to the date or the day after the race.

Chicago Rotary Engine Wants Site—The Chicago Rotary Engine Co., Chicago, Ill., a $100,000 corporation organized recently to engage in the manufacture of rotary type gasoline engines, is negotiating with the Business League of Oconomowoc, Wis., with a view to locating its works in that city. The condition is that Oconomowoc capital introduce approximately $20,000 into the firm, and it is believed that this can easily be accomplished.

Depere Factory for Billiken Cyclecar—It is learned that the proposition of establishing a cyclecar factory at Depere, Wis., now under consideration by the Depere Civic Assn., is from the Milwaukee Cyclecar Co., 513 First avenue, Milwaukee, which recently engaged in the production of a car under the title of Billiken. The concern already has orders for 1,000 cars and needs larger quarters. Depere capital is asked to take $25,000 in capital stock. The corporation is capitalized at $75,000 and the present owners hold $25,000. The remaining $25,000 is to remain in the treasury. The free use of an unused factory group at Depere for a period of 2 years is asked as the sole bonus, the company to have the privilege of buying thereafter.

Some Overland Figures—Though the figures in themselves are impressive, few people who are unfamiliar with the magnitude of the industry can appreciate what an annual production of 50,000 automobiles really means. In this respect the monthly car movement report made by the traffic department of the Willys-Overland Co., of Toledo, makers of the Overland automobile, is an enlightening document. Taking the figures for March, in which there were 26 working days, the report shows that a total of 2,358 railroad cars, incoming and outgoing, were handled at the plant. This is an average of more than ninety cars per day, or more than one loaded car every 7 minutes of a 10-hour day. Of the total number of cars moved, 748 were inbound, bringing raw materials and parts, and 1,610 were outbound, carrying finished cars for every part of the civilized world. As each outbound car has a capacity of at least three complete automobiles, and some are loaded with as many as six, the figures show an output of well over 5000 Overlands in 26 days.



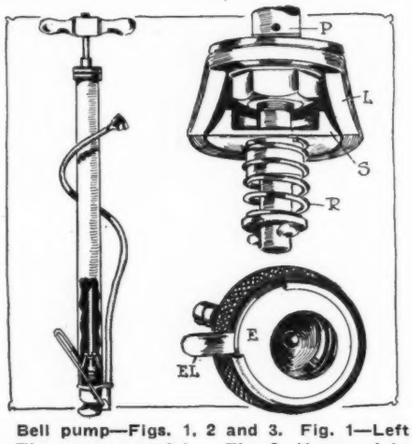
BELL FOOT PUMP—The Bell Pump Co., 78 Fort street, Detroit, has announced a tire pump with a plunger and connection to the tire valve, both of which are of new construction, and prevent leakages.

In general appearance this Bell pump is not unlike the conventional hand pump, but examination of the plunger reveals its ingenious construction. The pump is shown in Fig. 1, while the details of the plunger are made clear by Fig. 2. Referring to the latter, it will be noticed that the threaded plunger rod P carries the plunger leather L, which is held tightly by a nut and between two heavy washers. Underneath the plunger leather a bevel-edged brass spreader disk S is sleeved upon the plunger rod and held up against the plunger leather at all times by a strong steel spring R, which in turn is held in place by a cottered washer on the rod end.

When the plunger is forced down, the back pressure of the air in the pump forces the spreader disk up strongly against the leather, and thus holds the latter closely to the walls of the pump barrel, preventing air escapage by the plunger. On the up-stroke the steel spring maintains the close contact of the leather with the inside of the pump barrel and also permits no air escapage past the plunger.

A ball-check valve at the base of the pump prevents back pressure into the pump. The pump is built substantially and should have long life. The plunger rod is ⅜ inch steel, while the barrel is a heavy gauge brass and has a solid foot casting.

The Bell hose clamp for attachment to the tire valve is seen in Fig. 3. Unlike most hose connections which have rubber sockets or depend upon the air pressure to hold them in place, this employs a threaded internal eccentric E in addition to the rubber socket. This eccentric operates internally upon the threaded part of the tire valve tube. Having placed the rubber socket on the valve tube in the usual way, the eccentric lever EL is pushed over when the threaded eccentric inside the clamp engages the external threads of the valve tube in the same manner as a nut would, making a positive connection which cannot be removed until the eccentric lever is again thrown back to release it. The construction is said to do away entirely with escapage of air at the tube.



Bell pump—Figs. 1, 2 and 3. Fig. 1—Left—The pump complete. Fig. 2—Upper, right—Plunger details. Fig. 3—Lower, right—Hose clamp

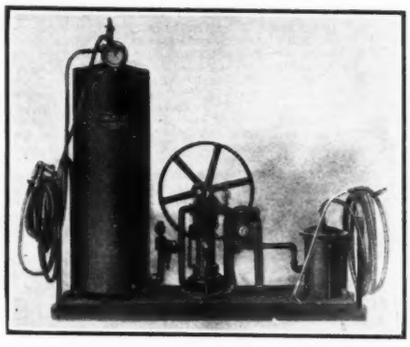


Fig. 4—Dunkley compressed air outfit

The Bell plunger principle is also employed in a grease gun, also made by the Bell Pump Co.

Dunkley Compressed Air Outfit—There is perhaps nothing more useful around the garage than a compressed air outfit, and the apparatus manufactured by the Dunkley Co., Kalamazoo, Mich., is particularly valuable in that it not only provides air for tire inflation, but is supplied with a vacuum cleaning attachment and a cleaner gun for getting at dirt with considerable air force.

The Dunkley outfit, Fig. 4, consists of a double-acting compressor, a vacuum tank, dust collector and an 80-gallon air tank, all of which are mounted on the same base. The compressor is mounted between the air tank and vacuum tank and pipe connections run from each. A suction by-pass in the piping to the vacuum tank and a pressure by-pass in the line to the air tank make it possible to use either at will. The compressor is designed to be driven by either external power through belt pulley connection or by an electric motor geared to it. This compressor is water-cooled and can give any pressure up to 250 pounds.

In connection with the air tank there is a place for the attachment of a tube for tire inflation, while another outlet takes care of the air going to the cleaner gun. The latter has two hose connections, one from the tank and the other from a gasoline reservoir suspended above the air tank, and also a part of the outfit. To operate the gun, the gasoline valve is first turned on, letting the right quantity flow, after which the air is turned on, atomizing the gasoline and forming a powerful cleansing blast, which is said to literally cut and eat the oil, grease and dirt off the parts to be cleaned. One great advantage of this is that the blast reaches every part of the machine, many corners of which would be inaccessible to a brush being cleaned.

The floor space required for the outfit is 7 by 2 feet.

Scott Curtains—A new idea in side curtains for the motor car appears in the equipment now being manufactured by the Star Storm Front Co., Troy, O., for touring cars and roadsters. These are known as the Scott curtains, Fig. 5.

This curtain equipment works on the window shade fixture plan, the curtains rolling onto all-metal rollers, which are fastened to the front upright bows on straight tops, to the windshield fixtures on roadsters and to the horizontal bows on one-man tops. The rollers themselves are contained in drawn-steel channel shields, which have special attaching fixtures, making it possible to remove the entire apparatus of curtains and rollers

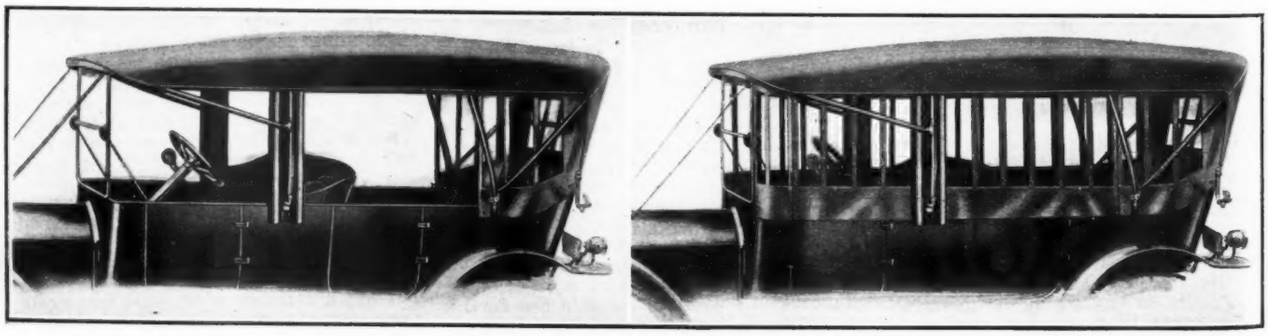
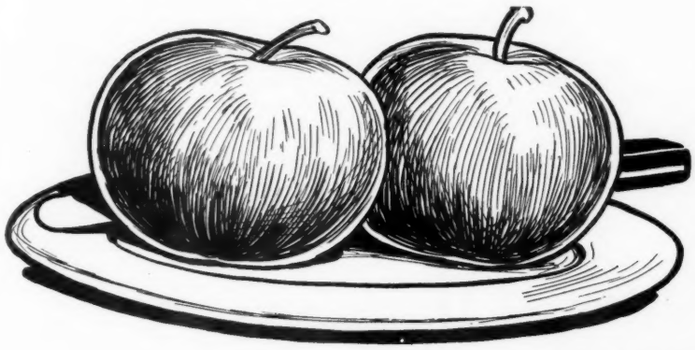


Fig. 5—Scott curtains in open and closed positions

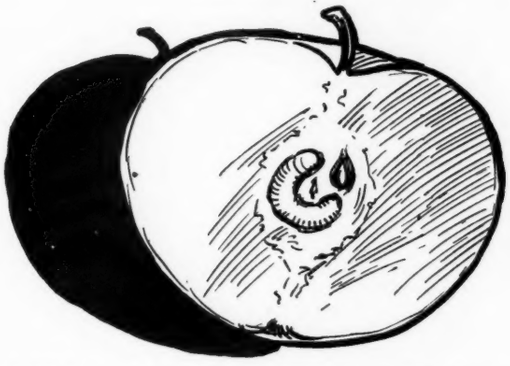
COMPARISONS



Two Apples May Look Exactly Alike on the Outside

BUT

HOW ABOUT



THE CORE

Two Electric Starting and Lighting Systems may, to the unskilled eye of the car owner, look exactly alike.

And as far as concerns many accessories, they may be alike, one just as good as the other.

But down in the core, there's a little Storage Battery, upon which, insignificant as it appears, depends the successful operation of the whole car.

Discriminating car buyers who know realize the vital importance of the storage battery, and will not accept, without question, any old thing that comes with the car.

Nearly all car manufacturers, however, have tried, tested, proven and adopted the LBA as the standard of excellence.

So examine the core of the electric system on the car you buy and look out for worms.

If you don't find an LBA battery there just remember that you are not getting the Storage Battery that the experts have pronounced the best.

Insist on having an LBA and make your dealer furnish it.

If he refuses, it's because the other is cheaper and you may rest assured the car is cheapened elsewhere.

Makers of good, reliable cars all furnish the LBA Battery.

LBA WILLARD STORAGE BATTERY CO. LBA

CLEVELAND, OHIO

New York Branch: 136 W. 52nd St. **Chicago Branch: 2241 Michigan Ave.**
Detroit Branch: 736-740 Woodward Ave. **San Francisco Branch: 243 Monadnock Bldg.**
Indianapolis Branch: 438 and 439 Indiana Pythian Bldg.

Service Stations in All Principal Cities in the United States, Canada and Mexico (99)

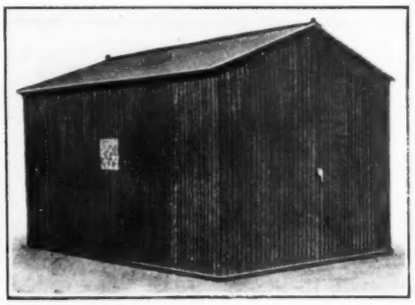


Fig. 6—Sectional steel garage

if desired. On straight tops the bottom part of the shield fits against an adjustable spring clip attached to the goose-neck top iron and straddling it so that one roller is on either side so as to allow one curtain to pull forward and the other to go to the rear. The top part of this double shield is engaged by an eccentric lever fastened on the inside of the bow about where this bow begins to curve into the top. In the case of roadsters, a single roller is used which unwinds to the rear from the side of the windshield. With the one-man top the curtains must pull downward.

To entirely strip the car of the curtain equipment the eccentric lever is first pushed up, after which the shield may be lifted from the lower fixture attached to the goose-neck. A leather case is provided for the rollers and shields, making it an easy matter to put the whole set away compactly within the storage compartment of the car if desired. It is said that it requires but half a minute to either remove or replace the entire equipment.

Since these curtains operate upon the shade roller principle, it is possible to allow large celluloid windows in them, making clear vision easy from within. The curtains may be drawn either from within the car or from the outside, which is also a feature of convenience. On releasing the catch, the curtains automatically roll up within the shields without trouble, due to the heavy tension springs within the rollers.

The Star Storm Front Co. has a Detroit office at 811 Woodward avenue.

Sectional Steel Garage—The Sectional Steel Garage Co., Detroit, has on the market a portable steel garage, Fig. 6, which is 10 by 16 feet, and which is built entirely of steel. The framework is of angle iron construction 1¼ by 1¼ by ⅛ inch, with holes drilled for the bolting of the sections together. The side sections are 24 inches wide and 8 feet high, there being seven of these on either side. The corners have a covering width of 12 inches each way, and are constructed in such a manner as to be the strongest and most substantial part of the entire structure. The roof trusses are made of the same angle iron size as the framework and are riveted together with one vertical center brace and two transverse stress braces, also riveted together.

The garage is provided with two large swinging doors, which are 4 feet wide and 8 feet high. The siding used is 26-gauge galvanized and beaded sheet metal, braced with angles. Over the roof framework are laid galvanized corrugated sheets of 26-gauge, with ⅝-inch corrugations. There are two windows 18 by 24 inches.

The garage weighs complete, ready for shipment, about 1,500 pounds, and is furnished with blue prints and instruction sheets ready to set up. All parts are marked to correspond with the blue print, which is a feature aiding quick erection. The garage is amply large for any touring car.

Barnard All-Fuel Carbureting System—By employing heat to vaporize the fuel so that it will mix with the air to form a combustible mixture, the device made by the Barnard Mfg. Co., 3300 Maple avenue, Los Angeles, Cal., enables the use

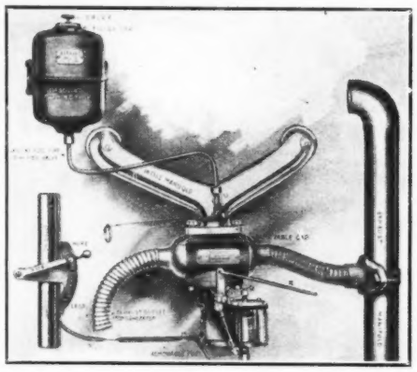


Fig. 7—Barnard all-fuel carbureting system in which the heat of the exhaust is utilized to vaporize the fuel which is known as gas oil

of gas oil at 2.75 cents per gallon instead of gasoline at 20 to 25 cents.

The complete system, Fig. 7, consists of a carbureter in which the fuel and air are proportioned; a generator for heating the mixture and cracking the heavy oil up into lighter constituents that will readily be vaporized by the heated air. The heat is supplied by the exhaust. A gasoline priming tank is used for starting, the tank holding about a quart of gasoline. The gasoline is injected at the base of the manifold.

The generator, which is inserted between the carbureter and the intake manifold, resembles a water tube boiler in construction, the heat passing through the tubes and the air and fuel around them. The generator is made of brass.

The exhaust is carried to the generator through a flexible tubing, about one-quarter of the total gas being used.

The quality of the fuel can be controlled from the steering post by means of the small lever shown at the left which moves the damper seen at the base of the carbureter.

It is stated that the operation of the system is perfect, that the gas oil will give just as much power as gasoline and that no carbon is deposited on the cylinders.

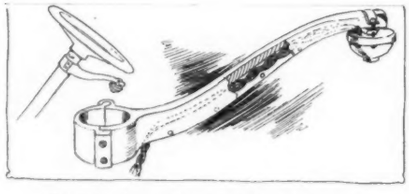


Fig. 8—Acme horn button bracket

Acme Horn Button Bracket—To obviate the difficulty of the horn button moving with the wheel the Acme Mfg. Co., Box 221, Passaic, N. J., is putting the bracket shown in Fig. 8, on the market.

The bracket is clamped to the steering wheel post and remains stationary when the wheel is turned. It is made of polished aluminum. The ordinary horn button is attached to the end of the bracket and the wire runs to the steering post through the bracket arm which is an inverted U-section. A clearance of 2 inches between the rim of the wheel and the bracket is advisable. The device is made for all sizes of wheels and lists at $3.

Dunkley Trailers—Trailers for attachment to motor vehicles are rapidly increasing in number, due to their usefulness for the carrying of light loads without interfering with passengers in the car.

To meet the demand for a light trailer for such work the Dunkley Co., Kalamazoo, Mich., has brought out two types, Fig. 9, one a four-wheeled vehicle and the other a two-wheeler. These are built along much the same lines as the ordinary spring wagon, and are fitted with drawing attachments at the front so as to hook onto the automobiles. A form of bow connector is used, one arm of which attaches to either end of the rear axle of the car and near the wheel. This places the pulling strain where it belongs and makes a very good connection. With the four-wheeler this bow is hinged horizontally at its center, where it attaches to a similar bow fastening to the front axle of the trailer, while in the two-wheeler construction the bow is hinged vertically.

J-M Mobilite Signal Lamp—An ingenious accessory, known as the J-M Mobilite Signal Lamp, consists of three small electric lamps mounted on an aluminum base finished in ebony black.

Whenever the steering wheel is turned to the right or left, a white arrow automatically appears in the corresponding lamp, indicating the direction in which the car will proceed. And when the clutch is thrown out the word "Stop" automatically appears in red in the center lamp. These signals are operated by self-contained, water-proof contacting devices attached to the steering gear and clutch, respectively. Each lamp unit is made up of a vulcanized rubber socket with a specially made tungsten bulb and a powerful reflector. The device is manufactured by the H. W. Johns-Manville Co., New York City.

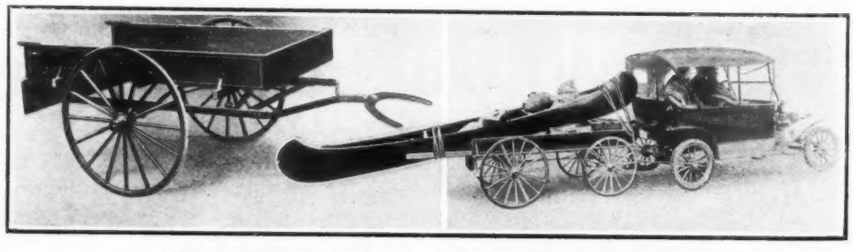


Fig. 9—Dunkley trailers in two and four-wheel styles